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## DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

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# VOLUME I ARMY ABSTRACTS OF PHASE I AWARDS 1989

VOLUME I

ARMY PROJECTS  
ABSTRACTS OF PHASE I AWARDS  
FROM  
FY 1989 SBIR SOLICITATION



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April 1990

## PREFACE

On September 11, 1989, the Department of Defense (DoD) announced the selection of small business firms proposals under Phase I of the Fiscal Year (FY) 1989 DoD Small Business Innovation Research (SBIR) Program to be funded upon successful completion of contract negotiations.

The selection of proposals for funding was made from proposals received by the Military Departments, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) in response to the FY 1989 solicitation distributed on October 1, 1988 with a closing date of January 6, 1990.

### FY 1989 Program

	<u>Number of Topics</u>	<u>Proposals Received</u>	<u>Phase I Awards</u>
Army	86	998	92
Navy	213	2239	323
Air Force	257	3479	337
DARPA	47	596	100
DNA	14	213	14
SDIO	<u>15</u>	<u>860</u>	<u>155</u>
	632	8385	1021

In order to make information available on the technical content of the Phase I projects supported by the Department of Defense SBIR Program, this report presents, in four volumes, the abstracts of those proposals which have resulted in contract awards.

This is Volume I which contains abstracts and contacts for the 92 Phase I projects funded by the Army from the FY 1989 SBIR Program. Projects funded by other DoD components are published in separate volumes as follows:

- Volume II - Navy Projects (Pages 59 - 266)
- Volume III - Air Force Projects (Pages 267 - 484)
- Volume IV - DARPA, DNA and SDIO Projects  
(Pages 485 - 668)

Venture capital and large industrial firms that may have an interest in the research described in the abstracts in this publication are encouraged to contact the SBIR firm whose name and address is shown.

## INTRODUCTION

On July 22, 1982 the President signed the "Small Business Innovation Development Act of 1982" (Public Law 97-219). This law became effective October 1, 1982 and was designed to give small high technology firms a greater share of Federal R&D contract awards.

The SBIR Program consists of three distinct phases. Under Phase I, DoD Components make awards to small businesses, typically of one-half to one man-year effort over a period generally not to exceed six months, subject to negotiation. Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas or concepts submitted in response to SBIR topics. All DoD topics address specific R&D needs to improve our defense posture. Proposals selected for contract award are those which contain an approach or idea that holds promise to provide an answer to the specific problem addressed in the topic. The successful completion of Phase I is a pre-requisite for further DoD support in Phase II.

Phase II awards will be made only to firms on the basis of results from the Phase I effort, and the scientific and technical merit of the Phase II proposal. In addition, proposals which identify a follow-on Phase III funding commitment from non-Federal sources will be given special consideration. Phase II awards will typically cover two to five man-years of effort over a period generally not to exceed 24 months, also subject to negotiation. The number of Phase II awards will depend upon the success rate of the Phase I effort and availability of funds. Phase II is the principal research or research and development effort, and will require a more comprehensive proposal which outlines the intended effort in detail.

Phase III is expected to involve private-sector investment and support for any necessary development that will bring an innovation to the marketplace. Also, under Phase III, DoD may award follow-on contracts not funded by the SBIR Program for products or processes meeting DoD mission needs.

### Selection Criteria

Phase I proposals received in each topic area in the DoD solicitation brochure are evaluated on a competitive basis in the organization which generated the topic, by scientists and engineers knowledgeable in that area and in accordance with the following criteria:

1. The scientific/technical quality of the research proposal and its relevance to the topic description, with special emphasis on its innovation and originality.
2. Qualifications of the principal investigator, other key staff, and consultants, if any, and the adequacy of available or obtainable instrumentation and facilities.

3. Anticipated benefits of the research to the total DoD research and development effort.

4. Adequacy of the Phase I proposed effort to show progress toward demonstrating the feasibility of the concept.

Public Law 99-443, the "Small Business Innovation Act of 1986" was signed by the President on October 6, 1986. This law re-authorized P.L. 97-219 to extend the "Sunset Clause" to 1993; to continue 1.25 percent taxation of the extramural research and development budget; and excludes from taxation those amounts of the DoD research and development budget obligated solely for operational systems development.

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ADVANCED COMPOSITE PRODUCTS INC  
21 COMMERCE DR  
NORTH BRANFORD, CT 06470  
CONTRACT NUMBER:  
DAVID MAASS

TITLE:

DEVELOPMENT OF THERMOPLASTIC MATRIX COMPOSITE FILAMENT WINDING  
TECHNOLOGY

TOPIC# 16      OFFICE: AVSCOM      IDENT#: 35672

THERMOPLASTIC MATRIX COMPOSITE MATERIALS SUCH AS GRAPHITE/PEEK AND GLASS/ULTEM OFFER GREAT POTENTIAL AS STRUCTURAL MATERIALS FOR HELICOPTER AIRFRAMES. THROUGH THE USE OF THERMOPLASTIC MATRIX COMPOSITES IT IS POSSIBLE TO BUILD THE LIGHTWEIGHT, DURABLE, DAMAGE TOLERANT STRUCTURE REQUIRED FOR HELICOPTERS. THIS PROGRAM IS DESIGNED TO DEVELOP AN AUTOMATED FIBER-REINFORCED THERMOPLASTIC FIBER PLACEMENT SYSTEM, SPECIFICALLY A FILAMENT WINDING SYSTEM. A MANUFACTURING METHOD FOR FILAMENT WINDING AND SIMULTANEOUSLY CONSOLIDATING SELECTED GRAPHITE AND/OR GLASS THERMOPLASTIC MATRIX COMBINATIONS IS DEVELOPED. A HOT-HEAD, LAYDOWN/CONSOLIDATION SYSTEM IS DESIGNED AND FABRICATED. MECHANICAL, PHYSICAL AND NONDESTRUCTIVE TEST DATA IS GENERATED USING THE SYSTEM USING FILAMENT WOUND THERMOPLASTIC MATRIX COMPOSITES. A FINAL REPORT IS PROVIDED WHICH SUMMARIZES THIS EFFORT AND PROVIDES GUIDELINES FOR FURTHER PHASE II DEVELOPMENT INCLUDING THE FABRICATION OF FILAMENT WOUND HELICOPTER STRUCTURES.

ADVANCED COMPOSITES LABS

224 CALVARY ST  
WALTHAM, MA 02154  
CONTRACT NUMBER:  
WILLIAM W HOUGHTON

TITLE:

IMPROVEMENT OF TEST INSTRUMENTATION FOR FILAMENT WOUND STRUCTURES

TOPIC# 33      OFFICE: MICOM      IDENT#: 34605

SEVERAL TECHNIQUES WHICH HAVE BEEN USED BY ACL TO MEASURE RESPONSE OF BOTH FILAMENT-WOUND AND BRAIDED GLASS, KEVLAR AND GRAPHITE EPOXY

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COMPOSITE TUBES WILL BE EMPLOYED IN THE INSTRUMENTATION OF A VARIETY OF FILAMENT-WOUND COMPOSITE STRUCTURES. THESE STRUCTURES WILL BE CHOSEN BY ACL AFTER TECHNICAL DISCUSSIONS WITH MICOM PERSONNEL, AND MAY INCLUDE GOVERNMENT FURNISHED STRUCTURES OF PARTICULAR INTEREST TO MICOM OR MODEL SUBSTRUCTURAL COMPONENTS SUPPLIED BY ACL. TECHNIQUES TO BE USED INCLUDE STRAIN GAGING, LASER EXTENSOMETRY AND MOIRE. THE SIZE OF THE GAGE AND THE NATURE AND EXTENT OF SURFACE PREPARATION HAVE BEEN FOUND TO BE CRITICAL FACTORS IN THE SUCCESSFUL STRAIN GAGING OF THESE FILAMENT-WOUND MATERIALS, AND THE INFLUENCE OF THESE VARIABLES ON THE RESPONSE OF THE VARIOUS MATERIALS CHOSEN IN THE STUDY WILL BE EVALUATED.

AEDAR CORP  
8302 STANWOOD ST  
NEW CARROLLTON, MD 20784  
CONTRACT NUMBER:  
DR JAMES A FABUNMI  
TITLE:  
CONTROL OF HELICOPTER ROTORBLADE AERODYNAMICS  
TOPIC# 9            OFFICE: AVSCOM            IDENT#: 33894

THE PROPOSAL IS CONCERNED WITH THE DEVELOPMENT OF A NEW CONCEPT FOR THE CONTROL OF THE AERODYNAMICS OF HELICOPTER ROTOR BLADES. SUCH A CONTROL DEVICE WILL MAKE IT POSSIBLE TO MECHANIZE THE HELICOPTER ROTOR AIR FOIL MUCH IN THE SAME WAY THAT THE WINGS OF FIXED WING AIRCRAFT ARE MECHANIZED TO ACHIEVE HIGH LIFT, STALL-FREE PERFORMANCE AT LOW SPEEDS. EXISTING METHODS FOR ACTIVE CONTROL OF HELICOPTER ROTORBLADE AERODYNAMICS USUALLY EMPLOY ACTUATORS IN THE NON-ROTATING FRAME. THE CONTROL ACTIONS ARE TRANSMITTED THROUGH THE SWASH PLATE. THIS GREATLY LIMITS THE ABILITY OF SUCH CONTROL SYSTEMS TO OPTIMIZE THE DESIRED INPUTS INTO EACH BLADE. THIS PROPOSED RESEARCH WILL EXPLORE A NUMBER OF CONCEPTS FOR DIRECTLY CONTROLLING THE DEFLECTIONS OF FLAPS ATTACHED TO HELICOPTER ROTOR BLADES. THE INVESTIGATION WILL FOCUS ON THE DEVELOPMENT AND TESTING OF PIEZO-ELECTRIC CERAMIC ACTUATORS, WHICH ARE CAPABLE OF DEFLECTING THESE FLAPS, IN RESPONSE TO APPLIED ELECTRIC SIGNALS.

AERODYNE RESEARCH INC  
45 MANNING RD  
BILLERICA, MA 01821  
CONTRACT NUMBER:  
JOHN A CONANT  
TITLE:  
AUTOMATIC TARGET MODEL DEGRADATION  
TOPIC# 35            OFFICE: MICOM            IDENT#: 34607

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HARDWARE-IN-THE-LOOP SENSOR TESTING PUTS STRONG CONSTRAINTS ON TARGET MODELING DUE TO THE NEEDS FOR HIGH SPEED AND ACCURACY. THESE CONSTRAINTS CAN BE MET BY SPECIFIC APPROACHES TO GEOMETRIC AND RADIANCE DEGRADATION. GEOMETRIC DEGRADATION MUST PRESERVE THE OVERALL OBJECT SHAPE, AND THE MAJOR REGIONS OF DIFFERENT RADIOMETRIC PROPERTIES. THIS CAN BE DONE BY CURVATURE APPROXIMATION AND DETAIL REDUCTION, UTILIZING THE SPIRITS WIREFRAME STRUCTURE. RADIANCE DEGRADATION MUST BE DONE BY SPATIAL AVERAGING OF RADIANCES COMPUTED AT HIGH RESOLUTION. THE AVERAGING CAN BE ACCOMPLISHED BY CONSTRAINING THE GEOMETRY DEGRADATION TO FOLLOW A "PARENT-CHILD" HIERARCHY. THE PHASE I EFFORT WILL GENERATE THE NECESSARY ALGORITHMS AND DATA STRUCTURE, AND WILL IMPLEMENT THEM IN ANSI STANDARD FORTRAN 77, CAPABLE OF EXECUTION ON A UNIX-BASED WORKSTATION.

ALPHATECH INC  
111 MIDDLESEX TNP  
BURLINGTON, MA 01803  
CONTRACT NUMBER:  
DR JEAN MacMILLAN

TITLE:

THE EFFECTS OF TRAINING AND EXPERIENCE FACTORS ON RAPID TACTICAL  
DECISION MAKING

TOPIC# 67      OFFICE: ARI      IDENT#: 33418

THIS SBIR PROPOSAL DISCUSSES THE DEVELOPMENT OF A THEORY OF TACTICAL DECISION MAKING EXPERTISE, BASED ON EXISTING LITERATURE AND INTERVIEWS WITH KEY MILITARY PERSONNEL. OUR CENTRAL THEORETICAL IDEA IS THAT EXPERT TACTICAL COMMANDERS HAVE A MENTAL MODEL OF THE BATTLE SITUATION THAT DIFFERS IN MEASURABLE WAYS FROM THAT OF NOVICES. WE SUGGEST THAT TRAINING AND EXPERIENCE FACTORS ENHANCE THE EXPERTISE OF THE COMMANDER BY IMPROVING THE RICHNESS, ACCURACY, AND TIMELINESS OF HIS/HER MENTAL MODEL OF THE TACTICAL SITUATION, AND THE CREATIVITY WITH WHICH IT IS APPLIED. A SET OF TESTABLE HYPOTHESES WILL BE EXTRACTED FROM THIS THEORY CONCERNING THE RELATIONSHIP BETWEEN MILITARY TRAINING AND EXPERIENCE FACTORS AND SUPERIOR TACTICAL DECISION PERFORMANCE BY EXPERTS. IN THE LONGER TERM, PHASE II OF THIS RESEARCH WILL BE A SOLID THEORY-BASED EXPERIMENTAL PROGRAM THAT WILL TEST THE HYPOTHESE DEVELOPED IN THE

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FIRST PHASE.

ALPHATECH INC  
111 MIDDLESEX TNP  
BURLINGTON, MA 01803  
CONTRACT NUMBER:  
DR JEAN MacMILLAN  
TITLE:  
TECHNIQUES FOR OPTION GENERATION IN DECISION MAKING  
TOPIC# 68      OFFICE: ARI      IDENT#: 33419

THE PROPOSED PHASE I RESEARCH WILL BUILD ON ALPHATECH'S THEORETICAL WORK ON THE GENERATION OF CRITICAL OPTIONS IN TACTICAL PLANNING AND ALPHATECH'S PRACTICAL EXPERIENCE OBSERVING PLANNING DEFICIENCIES IN FIELD EXERCISES. BOTH NORMATIVE THEORY AND DESCRIPTIONS OF ACTUAL PLANNING BEHAVIOR WILL BE USED TO IDENTIFY AREAS WHERE TACTICAL PLANNERS NEED DECISION SUPPORT IN ORDER TO GENERATE CRITICAL OPTIONS. FOUR CANDIDATE APPROACHES FOR DECISION AIDING ARE IDENTIFIED: 1) CONVEYING A MORE REALISTIC SENSE OF SITUATION UNCERTAINTY, INCLUDING MOST LIKELY AND WORST CASES; 2) CALCULATING MAXIMUM AND MINIMUM GAINS AND LOSSES; 3) CONVEYING A REALISTIC SENSE OF THE SPACE OF POSSIBLE OPTIONS; AND 4) FORCING CONSIDERATION OF FUTURE INFORMATION AVAILABILITY. ALTERNATIVE APPROACHES WILL BE EVALUATED USING A PROTOTYPICAL TACTICAL PLANNING TEST PROBLEM. THE TWO MOST PROMISING APPROACHES WILL BE TESTED IN AN EXPERIMENT USING A DECISION AID "MOCK UP" ON A MACINTOSH MICROCOMPUTER TO CONVEY TO SUBJECTS THE INFORMATION THAT WOULD BE GENERATED BY A DECISION AID. FINAL SELECTION OF THE MOST PROMISING OPTION GENERATION AIDING APPROACH WILL BE BASED ON EVALUATION OF THE EXPERIMENT.

ANACAPA SCIENCES INC  
PO DRAWER Q  
SANTA BARBARA, CA 93102  
CONTRACT NUMBER:  
STEVEN P ROGERS  
TITLE:  
DEVELOPMENT OF AN INTELLIGENT ON-BOARD MISSION PLANNING SYSTEM FOR  
ADVANCED ROTORCRAFT  
TOPIC# 3      OFFICE: AVSCOM      IDENT#: 33888

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THIS PROPOSAL DESCRIBES A PLAN AND METHODOLOGY FOR DETERMINING THE TECHNICAL MERIT AND FEASIBILITY OF DEVELOPING AN INTELLIGENT ON-BOARD MISSION PLANNING SYSTEM FOR ADVANCED ARMY ROTORCRAFT. ON-BOARD MISSION PLANNING, ALTHOUGH EXTREMELY DIFFICULT, IS ALREADY NECESSARY IN SOME ARMY OPERATIONS, AND THE REQUIREMENTS WILL BECOME OVER MORE PRESSING IN THE FUTURE. AN INTELLIGENT ON-BOARD SYSTEM IS NEEDED TO INTEGRATE, ORGANIZE AND PRIORITIZE EVER-INCREASING TACTICAL DATA, TO AID IN COMPLEX TERRAIN ANALYSIS AND INTERVISIBILITY TASKS, AND TO ASSIST IN TACTICAL DECISION MAKING PROCESSES. TO PERFORM THE PROPOSED WORK, IT IS NECESSARY THAT THE KEY PERSONNEL BE WELL-VERSED IN FOUR AREAS OF TECHNOLOGICAL ACTIVITY THAT ARE RELATED TO THE DEVELOPMENT OF SUCH A SYSTEM: COMPUTER-GENERATED MAPS, DIGITAL DATA LINKS, GROUND-BASED MISSION PLANNING AIDS, AND ARTIFICIAL INTELLIGENCE. ANALYSES OF THESE TECHNOLOGICAL AREAS MUST BE CONDUCTED IN THE LIGHT OF ARMY IN-FLIGHT DECISION-MAKING REQUIREMENTS. A DETAILED STUDY EFFORT WILL IDENTIFY THE FUNCTIONAL REQUIREMENTS OF AN ON-BOARD, KNOWLEDGE-BASED SYSTEM FOR ARMY USE, AND PROTOTYPE DEVELOPMENT WILL INCLUDE DESCRIPTIONS OF CONTENT AND FORMAT OF THE DISPLAYED INFORMATION, AND SPECIFICATION OF THE HIGH-PAYOFF APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THIS SETTING. THE PROTOTYPE WILL BE ACCOMPANIED BY AN OVERVIEW PLAN FOR FURTHER RESEARCH AND DEVELOPMENT USING THE NASA/ARMY CREW STATION RESEARCH AND DEVELOPMENT FACILITY (CSRDF) DURING PHASE II.

ANALYTICAL SOFTWARE INC

10939 MCCREE RD

DALLAS, TX 75238

CONTRACT NUMBER:

MARK HALEY

TITLE:

DECISION MAKING IN A GEOGRAPHICALLY DISTRIBUTED ENVIRONMENT

TOPIC# 86            OFFICE: AIRMICS            IDENT#: 33422

THE OBJECTIVE IS TO CREATE GROUP DECISION SUPPORT SYSTEM (GDSS) SOFTWARE WHICH PERMITS ARMY PERSONNEL TO QUICKLY MAKE DECISIONS, EVEN WHEN THE DECISION MAKERS ARE LOCATED AROUND THE WORLD. THE SOFTWARE WOULD OPERATE ON PERSONAL COMPUTERS, SUCH AS THE ZENITH 148, AND BE COMPATIBLE WITH THE ARMY'S WORD-PROCESSORS AND OTHER SOFTWARE.

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SPECIFIC PHASE I OBJECTIVES WILL BE TO DEFINE AND PROGRAM THE FEATURES WHICH THE MODEL MUST INCLUDE, SUCH AS: (1) IT MUST PROVIDE EASY-TO-USE WORD-PROCESSING, GRAPHICS, A CALENDAR, AND DATABASE, SO THAT A NOVICE USER COULD CREATE NEW DOCUMENTS, OR ADD COMMENTS TO DOCUMENTS WHICH ARE BEING REVIEWED FOR DECISIONS (2) IT MUST INCLUDE STATE-OF-THE-ART COMMUNICATIONS SO THAT ARMY DECISION MAKERS THROUGHOUT THE WORLD CAN BE INFORMED VIA FAX, ELECTRONIC MAIL OR PAPER MAIL AND (3) IT MUST COLLECT COMMENTS, TABULATE AND RANK VOTES OF THESE DECISION MAKERS, AND REPORT THESE RESULTS IN MINUTES. THIS SOFTWARE WOULD EXPEDITE ARMY DECISION MAKING WORLDWIDE. THE SOFTWARE WOULD PERMIT A COMPUTER NOVICE TO SEND ELECTRONIC MAIL, AND FAXES DIRECTLY FROM A PC THEREBY STREAMLINING COMMUNICATIONS IN THE ARMY.

ATSS INC  
606 E MILL ST - STE 2044  
SAN BERNARDINO, CA 92408  
CONTRACT NUMBER:  
HENRY MOODY  
TITLE:  
HEAT FLUX SENSOR FOR VULNERABILITY TESTING  
TOPIC# 49      OFFICE: TECOM/CSTA      IDENT#: 33412

A SENSOR CAPABLE OF MEASURING THE HEAT FLUX HISTORY RECEIVED BY SIMULATED TROOP PERSONNEL DURING WEAPON SYSTEM VULNERABILITY TESTS WILL BE DEVELOPED. THE PURPOSE OF THE SENSOR IS TO DETERMINE THE VULNERABILITY OF PERSONNEL OCCUPYING THE WEAPON SYSTEM TO BURNS. TO COVER THE WIDE DYNAMIC RANGE OF HEAT FLUX HISTORIES THAT CAN CAUSE BURNING, A GAGE USING TWO SEPARATE CALORIMETER ELEMENTS IS PROPOSED. THE CALORIMETERS WILL BE BASED ON THE SCHMIDT-BOELTER CONCEPT FOR THE LOWER RANGE - LONGER DURATION HEATING RATES, AND THE GARDON PRINCIPLE, FOR HIGHER HEATING RATES. TO MAINTAIN THE GAGE SURFACE TEMPERATURE AT LEVELS REPRESENTATIVE OF THE THERMAL RESPONSE OF HUMAN FLESH, THE GAGE WILL INCORPORATE A SELF-CONTAINED COOLING UNIT. THE METHODS USED TO CALIBRATE THE GAGE IN THE FIELD AND INTERPRET THE OUTPUT ALSO WILL BE DEVELOPED.

BAKER W ENGINEERING  
PO BOX 6477 - 8700 CROWNHILL/STE 310  
SAN ANTONIO, TX 78209  
CONTRACT NUMBER:  
QUENTIN A BAKER  
TITLE:  
PASSIVE AIRBLAST ATTENUATION VALVES FOR CONVENTIONAL WEAPONS  
TOPIC# 64      OFFICE: WES      IDENT#: 33416

SUBMITTED BY  
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THIS PROJECT INVOLVES ANALYSIS AND DESIGN OF SEVERAL CONFIGURATIONS FOR PASSIVE AIRBLAST VALVES TO STRONGLY ATTENUATE BLAST FROM CONVENTIONAL WEAPONS. DESIGN GOALS ARE ATTENUATION OF INCIDENT BLAST OVERPRESSURES BY AT LEAST TWO ORDERS OF MAGNITUDE, WHILE OFFERING NO MORE RESTRICTION TO NORMAL AIRFLOW THAN EXISTING ACTIVE BLAST VALVES. WE PROPOSE TO BASE OUR DESIGNS ON VENTED PANEL CONFIGURATIONS WHICH HAVE BEEN PROVEN TO BE EXCELLENT BLAST ATTENUATORS BY EXTENSIVE PREVIOUS ANALYSIS AND TESTING. WE WOULD ANALYZE, DESIGN, AND PRODUCE FABRICATION DRAWINGS FOR SEVERAL CONFIGURATIONS. CONSTRUCTION AND TESTING OF PASSIVE VALVES WOULD BE DEFERRED TO PHASE II.

BELTRAN INC  
1133 E 35TH ST  
BROOKLYN, NY 11210  
CONTRACT NUMBER:  
DR CONSTANCE SIMO  
TITLE:  
CONTROLLED CHEMICAL MODIFICATION OF ARAMID FIBER SURFACES TO  
ENHANCE FLAME RETARDATION  
TOPIC# 18      OFFICE: AVSCOM      IDENT#: 33902

CHEMICAL TREATMENT OF EXISTING ARAMID FIBERS IS PROPOSED TO INCREASE FLAME RETARDATION BY ENHANCING CHAR FORMATION AT THE SURFACE. SUCH SURFACE-CONTROLLED CHEMICAL MODIFICATION WITHOUT COMPROMISING THE FIBER'S MECHANICAL PROPERTIES, HAS BEEN DEMONSTRATED IN STUDIES UNRELATED TO IMPROVE FLAMMABILITY BEHAVIOR. THIS APPROACH IS SUBSTANTIVELY DIFFERENT FROM OTHER CURRENT APPROACHES TO IMPROVE FLAME RETARDANCE INCLUDING COATING WITH ALUMINUM AND BLENDING OF ARAMID POLYMERS OF DIFFERENT MACRO-STRUCTURE. THE FLAME RESISTANCE SHOULD DEVELOP FROM BOTH QUENCHING BY BROMINE RELEASE AND THERMALLY INDUCED INTERNAL CYCLIZATION AND INTER-MOLECULAR POLYMER CROSS-LINKING AT THE SURFACE OF THE FIBER. MECHANICAL PROPERTIES OF THE TREATED FIBERS WILL BE EVALUATED IN COMPARISON WITH UNTREATED CONTROLS. FLAMMABILITY CHARACTERISTICS INCLUDING FLASH POINT, SELF EXTINGUISHING BEHAVIOR AND GASES GENERATED UPON PYROLYSIS WILL BE DETERMINED FOR THOSE FIBERS COMPARABLE IN MECHANICAL PROPERTIES TO UNTREATED FIBERS. OPTIMIZATION OF TREATMENT CONDITIONS AND

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PRACTICALITY OF COMMERCIALIZATION CAN BE DETERMINED IN A PHASE II EFFORT.

BIO-STAR MEDICAL PRODUCTS INC  
5766 CENTRAL AVE  
BOULDER, CO 80301  
CONTRACT NUMBER:  
DR LUIS LOPEZ  
TITLE:  
SIMULTANEOUS DETECTION OF MULTIPLE DISEASE STATES  
TOPIC# 72      OFFICE: AMRDC      IDENT#: 34626

BIO-STAR PROPOSES TO DEVELOP A SOLID PHASE ASSAY FOR THE SIMULTANEOUS DETECTION OF THREE OR MORE ANALYTES (ANTIGENS AND/OR ANTIBODIES), USING AN OPTICAL INTERFERENCE SIGNAL. THIS OPTICAL IMMUNOASSAY (OIA) IS A TECHNIQUE FOR THE DIRECT PHYSICAL DETECTION OF THE IMMUNOCHEMICAL REACTION AND GENERALLY DOES NOT REQUIRE THE USE OF ANY ADDED REAGENTS. THE SIGNAL CAN BE DETECTED WITH THE UNAIDED EYE, OR WITH A REFLECTOMETER OR ELLIPSOMETER FOR QUANTIFICATION. EACH ASSAY WILL BE CONDUCTED ON A DISTINCT REACTION ZONE ON THE SLIDE. WE PROPOSE TO CONVERT THREE ELISA TESTS INTO THE OIA FORMAT DURING PHASE I. THESE TESTS DETECT THE PRESENCE OF ANTIBODIES ASSOCIATED WITH AUTOIMMUNE DISEASES. WE WILL DEMONSTRATE THE ABILITY TO IMMOBILIZE THREE DISTINCT CLASSES OF MOLECULES ON OUR SUBSTRATE, AND TO GENERATE A DETECTABLE SIGNAL WITH OIA. IN PHASE II WE WILL BUILD THE FINAL TRI-ANALYTE PROTOTYPE, THEN USE THIS ASSAY DEVELOPMENT EXPERIENCE TO DESIGN A TRI-ANALYTE TEST FOR THREE DISEASES OF MILITARY SIGNIFICANCE. THE FINAL TEST WILL BE SENSITIVE, RAPID, AND SUITABLE FOR USE IN BOTH LABORATORY AND FIELD ENVIRONMENTS. THE FLEXIBILITY AND SIMPLICITY OF THE OIA FORMAT MAKES THIS TECHNOLOGY IDEALLY SUITED TO THE DEVELOPMENT OF TRI-ANALYTE IMMUNOASSAYS.

CAPE COD RESEARCH INC  
PO BOX 600  
BUZZARDS BAY, MA 02532  
CONTRACT NUMBER:  
DR BRIAN DIXON  
TITLE:  
PASSIVE LOW BULK COOLING VEST  
TOPIC# 5      OFFICE: AVSCOM      IDENT#: 33891

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THE PROPOSED RESEARCH INVESTIGATES THE FEASIBILITY OF DEVELOPING A LOW BULK, COOLING VEST THAT POSSESSES AN ENHANCED CAPABILITY TO PROTECT THE WEARER DURING CONDITIONS OF THERMAL BURDEN. THE SUCCESSFUL COMPLETION OF THIS RESEARCH PROGRAM WILL RESULT IN A VEST THAT PERMITS SIGNIFICANTLY MORE DEXTERITY AS WELL AS PROVIDE INCREASED COMFORT. IN ADDITION, IT WILL BE POSSIBLE TO INCORPORATE THE NEW MATERIAL INTO CURRENT CHEMICAL COOLING VEST CONSTRUCTIONS.

CAPE COD RESEARCH INC  
PO BOX 600  
BUZZARDS BAY, MA 02532  
CONTRACT NUMBER:  
FRANK KEOHAN

TITLE:  
IMPROVED ADHESIVE SYSTEM FOR BONDING SELECTED ELASTOMERS  
TOPIC# 32      OFFICE: NRDC      IDENT#: 34876

A PROCESS FOR ADHESIVELY BONDING SELECTED ELASTOMERS IS PROPOSED WHICH CAN SIGNIFICANTLY SIMPLIFY ADHESIVE BONDED MANUFACTURING AND REPAIR PROCEDURES. THE PROPOSED RESEARCH EXPLORES THE FEASIBILITY OF USING NON-HAZARDOUS SURFACE TREATMENTS ON VULCANIZED RUBBER SUBSTRATES WHICH PROVIDE BONDS OF EQUAL OR GREATER STRENGTH THAN THE RUBBER ADHERENDS THEMSELVES. THESE NOVEL SURFACE TREATMENTS SHOULD PREPARE DIFFICULT-TO-ADHERE RUBBER SURFACES FOR STRONG, DURABLE BONDING WITH INEXPENSIVE, VERSATILE ADHESIVE WHICH ALSO STRONGLY ADHERES TO MORE POLAR SUBSTRATES SUCH AS METALS, GLASS, AND POLYEPICHLOROHYDRIN RUBBER. ADHESIVE BONDS PRODUCED BY THIS TECHNIQUE SHOULD ALSO EXHIBIT OUTSTANDING RESISTANCE TO ENVIRONMENTAL STRESSES SUCH AS U.V. RADIATION AND HYDROLYTIC DEGRADATION.

CAPE COD RESEARCH INC  
PO BOX 600  
BUZZARDS BAY, MA 02532  
CONTRACT NUMBER: DACA88-89-C-0010  
JOHN R DEANS

TITLE:  
NON-INTRUSIVE STANDARDIZED TEST METHOD FOR LEAD CONTROL  
TOPIC# 61      OFFICE: CERL      IDENT#: 35302

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RECENT AMENDMENTS TO THE SAFE DRINKING WATER ACT (SDWA), APPLICABLE TO ALL ARMY INSTALLATIONS, REQUIRE EXTENSIVE MONITORING OF LEAD CONCENTRATIONS IN DRINKING WATER AT THE CONSUMER'S TAP. THIS RESEARCH EXPLORES THE FEASIBILITY OF A NON-INTRUSIVE STANDARDIZED TEST METHOD FOR LEAD CONTROL, WHICH DOES NOT REQUIRE UTILITY PERSONNEL TO ENTER CONSUMER'S HOMES. THE STANDARD TEST PROPOSED IS DESIGNED TO BE ADMINISTERED BY THE CONSUMER. THE INFORMATION OBTAINED PERMITS IDENTIFICATION OF LEAD LEACHING FROM HOME PLUMBING SO THAT UTILITY PERSONNEL CAN BE NOTIFIED FOR REMEDIATION.

CARDINAL SCIENTIFIC INC

124 INDIAN CT

WALDORF, MD 20601

CONTRACT NUMBER:

JOHN BURKE

TITLE:

NOZZLE ASSEMBLY FOR ARMY MASS DELOUSING OUTFIT

TOPIC# 76      OFFICE: AMRDC      IDENT#: 34629

PROPOSES A RECONFIGURED KIORITZ DM-9 BACKPACK SPRAYER THAT WILL (1) DISPENSE METERED VOLUME OF PEDICULICIDE, (2) EMPLOY EXISTING SYSTEM ENERGY SOURCE, (3) ACCESS 17 DISPERSAL SITES/PERSON, AND (4) MAINTAIN ADEQUATE FLOW DIAMETERS. A DESIGN IS POSTULATED THAT INCORPORATES VACUUM ACTUATED SLIDE VALVES, A METERING CHAMBER, AND NOZZLE EFFECTIVENESS. A SURVEY OF PREVIOUS RESEARCH AND TESTING WILL BE CONDUCTED. REQUIRED TESTING WILL ESTABLISH BLOWER BASELINES AND DETERMINE NEEDED CHANGES, OPTIMUM CHOICES OF HOPPER WITH VARIABLE VOLUME, METHODS OF METER ACTUATION, LOCATION OF METERING DEVICES, AND AMOUNT OF HEAT LOSS. THE FLEXIBLE ELBOW NOZZLE DESIGN WILL FEATURE A FUNCTIONAL OUTLET, MAXIMIZE CROSS SECTION, AND MINIMIZE DISPERSAL AREA.

CDS INC

PO BOX 292677

KETTERING, OH 45429

CONTRACT NUMBER:

WILLIAM R BELCHER

TITLE:

SORBENTS FOR DECONTAMINATION OF CHEMICAL WARFARE AGENTS

TOPIC# 2      OFFICE: CRDEC      IDENT#: 33401

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THE U.S. MILITARY IS IN DIRE NEED OF NEW DECONTAMINATION METHODS/  
SYSTEMS. THE CURRENT M258A1 AND D52 ARE EXCESSIVELY CORROSIVE AND  
A REPLACEMENT IS SOUGHT. IT HAS BEEN PROPOSED THAT THE IDEAL  
DECONTAMINATION WOULD CONSIST OF A SOLID SORBENT WITH REACTIVE  
LIGANDS. CDS, INC. BELIEVES THAT THIS IDEA COULD BE A REALITY  
UTILIZING IN-HOUSE TECHNOLOGY.

CFD RESEARCH CORP  
3313 BOB WALLACE AVE - STE 205  
HUNTSVILLE, AL 35805  
CONTRACT NUMBER:  
CLIFFORD E SMITH

TITLE:

AN ADVANCED DILUTION HOLE CONCEPT TO REDUCE PATTERN FACTOR IN GAS  
TURBINE COMBUSTORS

TOPIC# 15 OFFICE: AVSCOM IDENT#: 33899

OF CRITICAL IMPORTANCE IS ADVANCED TECHNOLOGY GAS TURBINE COMBUSTORS  
IS THE REDUCTION OF EXIT TEMPERATURE NON-UNIFORMITY, COMMONLY KNOWN  
AS PATTERN FACTOR. A PRINCIPAL CAUSE OF TEMPERATURE NON-UNIFORMITY  
IS THE LACK OF PENETRATION AND MIXING OF DILUTION AIR IN THE COM-  
BUSTOR DILUTION ZONE. AN ADVANCED DILUTION HOLE CONCEPT IS PROPOSED  
THAT IMPROVES JET PENETRATION AND MIXING COMPARED TO CONVENTIONAL  
HOLE DESIGNS. THE CONCEPT EMPLOYS CO-AXIAL JETS; THE OUTER JET IS  
SWIRLED WHILE THE INNER JET IS NOT. A RADIAL PRESSURE DROP, CAUSED  
BY OUTER SWIRL, RESULTS IN A PRESSURE DROP ACROSS THE INNER JET MUCH  
HIGHER THAN THE COMBUSTOR LINER PRESSURE DROP. THE INCREASED  
PRESSURE DROP IS EXPECTED TO GREATLY ENHANCE PENETRATION AND MIXING  
OF THE INNER DILUTION JET. PHASE I WILL USE COMPUTATIONAL FLUID  
DYNAMICS TECHNIQUES TO ANALYZE AND COMPARE CONVENTIONAL AND ADVANCED  
HOLE DESIGNS. THE TECHNICAL MERIT AND FEASIBILITY OF THE CONCEPT  
WILL BE VERIFIED OR DISPROVED. IF VERIFIED, PHASE II WILL OPTIMIZE  
THE CONCEPT AND DEVELOP A DESIGN SYSTEM FOR ITS IMPLEMENTATION.  
OPTIMUM CONFIGURATIONS WILL BE FABRICATED AND EXPERIMENTALLY TESTED.

CHARLES SYSTEMS CORP  
820 HEATHERWAY  
ANN ARBOR, MI 48104  
CONTRACT NUMBER:  
CHARLES J JACOBUS

TITLE:

TESTING EMBEDDED AND PARALLEL SYSTEMS

TOPIC# 51 OFFICE: TECOM/EPG IDENT#: 33414

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SOFTWARE SYSTEMS FOR MANY MILITARY AND SPACECRAFT EMBEDDED AND PARALLEL (DISTRIBUTED) SYSTEMS APPLICATIONS ARE EXTENSIVE AND HIGHLY COMPLEX, MAKING DESIGN, SAFETY ANALYSIS, VERIFICATION AND TESTING DIFFICULT. SIMILAR PROBLEMS HAVE PLAGUED VLSI HARDWARE DEVELOPERS, AND LIKE IN SPACE AND MILITARY CONTEXTS, THE COST FOR REWORK DUE TO SYSTEMS DESIGN ERRORS HAS DRIVEN DEVELOPMENT OF VALIDATION AND VERIFICATION METHODOLOGIES AND ASSOCIATED TOOLS. WE PROPOSE TO ADAPT SOME OF THESE TESTING APPROACHES TYPICALLY USED IN VLSI SYSTEM VALIDATION TO THE TESTING OF LARGE AI AND CONVENTIONAL SOFTWARE SYSTEMS, AND BUILD AN EFFICIENT DEVELOPMENT ENVIRONMENT FOR LISP (AND, IN PHASE II, ADA AND/OR CMS-3) TO SUPPORT THEM. WE BELIEVE THE TOOLS PROPOSED WILL BE USEFUL DURING REVERSE SOFTWARE ENGINEERING, AS WELL, BECAUSE KEY RELATIONSHIPS BETWEEN MODULES, VARIABLES, AND CONDITIONAL PATHS WILL BE ILLUCIDATED.

CHASE TECHNOLOGIES INC  
3543 CAMINITO CARMEL LANDING  
SAN DIEGO, CA 92130  
CONTRACT NUMBER:  
LEONID B VOLFSON  
TITLE:  
MULTISPECTRAL DATA PROCESSING  
TOPIC# 47      OFFICE: TECOM/WSMR      IDENT#: 33410

AN INNOVATIVE METHODOLOGY HAS BEEN DEVELOPED, BASED ON THE STATE-OF-THE-ART INTERACTIVE DATA ACQUISITION, IMAGE PROCESSING AND SEGMENTATION ANALYSIS. IN PHASE I WE SHALL UNDERTAKE TO CARRY OUT A PROOF-OF-CONCEPT STUDY TO DEMONSTRATE THE FEASIBILITY OF USING PATTERN RECOGNITION TECHNIQUES TO ANALYZE MULTI-SENSOR INPUTS AND EXTRACT THE TARGET INFORMATION. AS A RESULT WE PROPOSE TO DEVELOP AND TEST A COMPREHENSIVE AUTOMATED INFIGHT TRACKING SYSTEM, WHICH BE COMBINING A PRIORI TARGET INFORMATION, COMPUTER GRAPHICS METHODS, AND SIGNAL PROCESSING TECHNIQUES IS CAPABLE OF INJECTING MULTI-SENSOR INPUT STREAMS AND OF PRODUCING THREE-DIMENSION IMAGE, SIX DIMENSIONAL DATA (POSITION AND ATTITUDE), AS WELL AS ACCURATE RECONSTRUCTION OF A SIX-DIMENSIONAL TARGET TRAJECTORY (POSITION AND ATTITUDE AS A FUNCTION OF TIME).

COMMUNICATIONS TECHNOLOGY APPLICATIONS  
7927 JONES BRANCH DR - STE 300  
McLEAN, VA 22102  
CONTRACT NUMBER:  
EDWARD CONNELLY  
TITLE:  
DEVELOPMENT OF METHODOLOGY FOR ASSESSING THE EFFECTNESS OF COMMAN AND (C2) FUNCTIONS DURING USER TESTING  
TOPIC# 69      OFFICE: ARI      IDENT#: 33420

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THE OBJECTIVE OF THE PROPOSED RESEARCH IS THE DEVELOPMENT OF A METHOD OF GENERATING EFFECTIVENESS MEASURES FOR USER TESTING OF C2 SYSTEMS. THE MEASURE, CALLED A "MOMENT-TO MOMENT" (MTM) MEASURE, INDICATES THE IMPACT OF PERFORMANCE OF EACH COMMAND GROUP TASK ON OVERALL BATTLE SYSTEM EFFECTIVENESS. IN ADDITION TO THE DEVELOPMENT OF A METHOD FOR GENERATING THE MEASURE, IT IS PROPOSED TO DEVELOP A MTM MEASURE FOR A SELECTED BATTLE SYSTEM, OPERATING IN A SPECIFIED ENVIRONMENT, AND PERFORMING A SPECIFIED MISSION. THE MEASURE WILL ASSIST USER TESTING BY HELPING IN THE DESIGN OF THE TESTING, IDENTIFYING WHICH VARIABLES TO OBSERVE AND COLLECT DATA FOR, AND SPECIFYING THE DATA PROCESSING REQUIRED TO ASSESS THE COMMAND GROUP TASKS AND OVERALL BATTLE SYSTEM EFFECTIVENESS. THE PHASE I EFFORT WILL INCLUDE DEVELOPMENT OF A SINGLE MEASURE, BASED ON ONE C2 MISSION SELECTED FOR INVESTIGATION. IT IS EXPECTED THAT FIELD TESTING AND EVALUATION OF THE MEASURE WILL BE PERFORMED IN PHASE II.

CON-SOLVE INC  
171 CONCORD RD  
WAYLAND, MA 01778  
CONTRACT NUMBER: DAAB07-89-C-A043  
WALTER E GILLET  
TITLE:  
AI FOR COMMAND AND CONTROL DECISION AIDS  
TOPIC# 53      OFFICE: CECOM-C/3      IDENT#: 34618

THE PROPOSED WORK WILL BUILD UPON EXISTING TERRAIN MODELING AND ARTIFICIAL INTELLIGENCE SYSTEMS TO DEVELOP A PROTOTYPE COMMAND AND CONTROL DECISION AID FOR ARMY COMMANDERS AND STAFF. A PROTOTYPE WILL BE DEVELOPED DURING PHASE I. THE NEW SYSTEM "TERRAIN PLAN," WILL BE IMPLEMENTED IN COMMAND LISP ON UNIX-BASED ENGINEERING WORKSTATIONS. TERRAIN PLAN WILL USE AN AI-BASED DECISION SUPPORT CORE TO UNIFY (1) AN INTEGRATED GEOGRAPHIC INFORMATION SYSTEM AND TERRAIN ANALYSIS SYSTEM, (2) AN OBJECT-ORIENTED DATABASE, AND (3) TACTICAL DECISION AIDS. SPECIFIC DECISION AIDS TO BE BUILD INTO THE PROTOTYPE WILL BE DECIDED IN PHASE I, BUT INCLUDE A NUMBER OF TERRAIN ANALYSIS AND FIELD OPERATIONS PLANNING TOOLS. SEVERAL SUCH TOOLS CAN BE MODIFIED QUICKLY FROM SHELLS ALREADY DEVELOPED. THE USER WILL INTERACT WITH TERRAIN MODELS AND VIEW DATA (E.G., TOPOGRAPHY, ROAD NET-

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WORKS, VEHICLE CHARACTERISTICS) THROUGH A MULTISCREEN GRAPHICAL INTERFACE. THE AI-BASED DECISION SUPPORT CORE SERVES AS A BUFFER BETWEEN THE USER AND THE SYSTEM TO HELP FORMALIZE LOGISTICAL PROBLEMS, RETRIEVE NECESSARY DATA, AND INTERPRET ANALYSES. SIMULATION CAPABILITIES WILL BE AVAILABLE FOR EVALUATING LOGISTICS DECISIONS TO COMPLEX TO BE RESOLVED ANALYTICALLY, AND FOR TRAINING PURPOSES.

CORVAS INC  
11077 N TORREY PINES RD  
LA JOLLA, CA 92037  
CONTRACT NUMBER:  
DR MICHAEL G PEPE  
TITLE:  
INHIBITORS AND IMMUNOASSAY FOR SEPTIC SHOCK/DIC  
TOPIC# 80      OFFICE: AMRDC      IDENT#: 34865

DISSEMINATED INTRAVASCULAR COAGULATION (DIC) IS AN UNDERLYING PATHOGENETIC MECHANISM IN CASES OF VIREMIA (INCLUDING DENGUE HEMMORHAGIC FEVER) AND SEPTICEMIA. THE DEVELOPMENT OF THERAPY AND DECISIVE DIAGNOSTIC TECHNIQUES TO MONITOR THE PROGRESS OF THERAPY ARE IMPORTANT FOR INDIVIDUALS WITH SEPTIC SHOCK DUE TO THERMAL INJURY OR BIOLOGICAL WARFARE WHERE INFECTIONS RESULT IN A HIGH MORBIDITY AND MORTALITY. WE PROPOSE TO DEVELOP NOVEL PEPIDYL CHLOROMETHYL KETONES (CMKs) OF THERAPEUTIC UTILITY TO INTERRUPT ONE OF THE FUNDAMENTAL PATHOGENETIC MECHANISMS IN SEVERE LIFE-THREATING DIC, SEPTIC SHOCK, THROMBOTIC AND RELATED COMPLICATIONS IN WHICH THE INTRAVASCULAR ACTIVATION OF COAGULATION PLAYS A SIGNIFICANT ROLE. IRREVERSIBLE INHIBITORS ARE PREDICTED TO BE OF THERAPEUTIC VALUE BASED ON THE SPECIFIC BINDING TO THE SERINE PROTEASE CATALYTIC SITE OF THE TISSUE FACTOR (TF):FACTOR VII/VIIa DELLURLAR INITIATING COMPLEX OF COAGULATION AND THE SUBSEQUENT IRREVERSIBLE INHIBITION THEREOF. IMMUNO-ASSAYS OF PEPTIDES RELEASED UPON ACTIVATION OF ZYMOGENS IN THE CLOTTING CASCADE PROVIDE QUANTITATION AND ARE USEFUL DIAGNOSTIC INDICATORS OF ENZYMATIC ACTIVITY. THEREFORE, IN CONJUNCTION WITH A SPECIFIC INHIBITOR OF FACTOR VII/VIIa, WE ARE PROPOSING TO DEVELOP A SPECIFIC IMMUNOASSAY FOR FACTOR X ACTIVATION PEPTIDE WHICH WOULD MONITOR TF:FACTOR VII/VIIa ACTIVITY IN VITRO AND IN VIVO, FACILITATING THERAPEUTIC DECISION MAKING.

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DAMASKOS INC  
PO BOX 469  
CONCORDVILLE, PA 19331  
CONTRACT NUMBER:  
BENUEL J KELSALL  
TITLE:  
THIN BROAD BAND VHF/UHF ABSORBER CONCEPTS  
TOPIC# 43      OFFICE: MICOM      IDENT#: 34615

A THIN BROADBAND NORMAL INCIDENCE VHF/UHF ABSORBER WILL BE DESIGNED. THE ABSORBER WILL BE A LAMINATE STRUCTURE USING MAGNETIC ABSORBING MATERIAL TO PROVIDE THE PRIMARY LOSS MECHANISM. THE MAGRAM WILL BE LOADED WITH OTHER MATERIALS TO CONTROL ITS IMPEDANCE AND INCREASE ITS INDEX OF REFRACTION. IMPEDANCE TRANSFORMATION LAYERS WILL BE ADDED TO CONTROL THE IMPEDANCE INTO THE ABSORBING MATERIAL. THESE IMPEDANCE LAYERS WILL IMPROVE THE EFFICIENCY OF THE ABSORBER AND GIVE IT BROADBAND CHARACTERISTICS. IN ADDITION, THIS STUDY WILL ALSO INVESTIGATE THE APPLICATION OF CIRCUIT ANALOG SHEETS TO INCREASE ABSORBER BANDWIDTH.

DEFENSE SYSTEMS CONCEPTS (DSC)  
1340 ASHTON RD - STE A  
HANOVER, MD 21076  
CONTRACT NUMBER:  
ROBERT LITTLEPAGE  
TITLE:  
CONCEPTS FOR SPATIALLY ENCODING MILLIMETER WAVE BEAM  
TOPIC# 38      OFFICE: MICOM      IDENT#: 34610

A CONCEPT FOR USING SIDEBAND MODULATIONS TO CREATE A MONOPULSE LIKE GUIDANCE SIGNAL SUITABLE FOR USE BY A MISSILE IN FLIGHT IS PRESENTED. THIS APPROACH OFFERS ADVANTAGES OVER A TRUE MONOPULSE WHICH INCLUDE: VERY LOW COST/SIMPLE ON-BOARD RECEIVER; REDUCE MULTI-PATH PROBLEMS DUE TO LOW ANGLE CLUTTER; AND, GROWTH POTENTIAL TO INCLUDE RANGE INFORMATION NECESSARY FOR USE WITH AN ACTIVE TERMINAL GUIDANCE (HYBIRD SYSTEM). IN ADDITION, A SOLUTION IS OFFERED FOR THE

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ACQUISITION PROBLEM. INITIAL MISSILE LOCK-UP IS FACILITATED THROUGH THE USE OF A VARIABLE BEAMWIDTH RADIATING ELEMENT.

DIAGNOSTIC EQUIPMENT DEVELOPMENT INC  
PO BOX 2056  
ASTON, PA 19014  
CONTRACT NUMBER:  
DAVID B BOARD  
TITLE:  
FATIGUE LIFE MONITOR (NON-AIRFRAME)  
TOPIC# 4      OFFICE: AVSCOM      IDENT#: 33889

DIAGNOSTIC TECHNIQUES FOR FATIGUE LIFE MONITORING OF DYNAMIC COMPONENTS SUCH AS GEARS, BEARINGS, AND SHAFTS WILL BE EVALUATED AND INTEGRATED INTO AN OVERALL CONCEPT FOR AN AIRBORNE FATIGUE LIFE MONITORING SYSTEM. A DRAFT SPECIFICATION WILL BE WRITTEN TO DEFINE THE FUNCTIONAL ELEMENTS OF A FATIGUE LIFE MONITORING SYSTEM FOR THE DRIVE TRAIN OF A CH-47D HELICOPTER. THE SYSTEM SPECIFICATION WILL INCLUDE ALGORITHMS FOR DATA PROCESSING, DATA COMPRESSION, DATA SAMPLING ROUTINES, AND VOTING LOGIC TO MAXIMIZE THE PROBABILITY OF DETECTING TRUE FAULTS WHILE MINIMIZING THE PROBABILITY OF TRIGGERING A FALSE ALARM.

DIGITAL FANTASIES LTD  
2230 GALLOWS RD  
DUNN LORING, VA 22027  
CONTRACT NUMBER: DAAB07-89-C-B919  
JOHN DEAN  
TITLE:  
REQUIREMENTS ENGINEERING TECHNOLOGY  
TOPIC# 54      OFFICE: CECOM-S/E      IDENT#: 34620

EFFECTIVE USE OF CURRENT FUNCTIONAL AND PROCESS ORIENTED REQUIREMENTS ANALYSIS TECHNIQUES IS DIFFICULT BECAUSE OF THEIR STATIC NATURE AND COMPLEX NOTATIONS. THESE METHODOLOGIES HAVE MOLDED REQUIREMENTS INTO A FUNCTIONAL FRAMEWORK WITH A SYSTEM BEING DESCRIBED IN TERMS OF WHAT IT DOES, NOT WHAT IT IS. OBJECT ORIENTED

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REQUIREMENTS ANALYSIS, AN EXPRESSIVE AND EASILY ADAPTABLE REQUIREMENTS ANALYSIS METHODOLOGY, MODELS THE PROBLEM DOMAIN(S) IN TERMS OF OBJECTS, ATTRIBUTES, SERVICES, AND RELATIONSHIPS. THIS METHODOLOGY IS DESIRABLE BECAUSE IT ORGANIZES SYSTEMS IN TERMS OF COMPONENTS AND NOT FUNCTIONALITY; HAS STRONG ABSTRACTION AND ENCAPSULATION; AND PROVIDE SIMPLE NOTATIONS AND GRAPHICAL MEANS BY WHICH TO EXPRESS THE REQUIREMENTS TO THE VARIOUS PEOPLE INVOLVED IN THE SYSTEM LIFE CYCLE.

DYNA EAST CORP  
3201 ARCH ST - 3RD FL  
PHILADELPHIA, PA 19104  
CONTRACT NUMBER:  
ROBERT D CICCARELLI  
TITLE:  
DEVELOPMENT OF A MOLYBDENUM FRONT STAGE WARHEAT FOR USE IN A  
TANDEM SYSTEM  
TOPIC# 41      OFFICE: MICOM      IDENT#: 34613

ADVANCES IN ARMOR TECHNOLOGY HAVE PROGRESSED BEYOND THE PERFORMANCE OF CURRENT CHEMICAL ENERGY WEAPONS SYSTEMS. SYSTEMS INCORPORATING TANDEM WARHEADS HAVE SHOWN PROMISE IN DEFEATING PROPOSED ARMOR THREATS. THE KEY TO A TANDEM WARHEAD SYSTEM'S PERFORMANCE IS THE FRONT STAGE. SUCCESSFUL FRONT STAGE DESIGNS WILL SOFTEN THE TARGET, ALLOWING THE REAR STAGE TO PENETRATE DEEP INTO THE TARGET. FRONT STAGE DESIGN UTILIZING A HIGH VELOCITY JET CONCEPT HAS SHOWN SUCCESS. COPPER HAS BEEN THE PRIMARY MATERIAL USED IN DESIGNS TO DATA. ALTERNATE MATERIALS WITH HIGH DENSITY AND HIGH SOUND SPEED WOULD BE DESIRABLE. MOLYBDENUM, WITH A DENSITY OF 10.3 g/cm<sup>3</sup> AND A SOUND SPEED OF 5.124 km/s, IS IDEAL. MOLYBDENUM DESIGN HAVE BEEN DEMONSTRATED WITH A TIP VELOCITY NEAR 12.0 k/s. THE PROPOSED PROGRAM WILL INVESTIGATE THE USE OF MOLYBDENUM AS THE LINEAR MATERIAL FOR A FRONT STAGE WARHEAD IN A TANDEM SYSTEM.

DYNAGEN INC  
99 ERIE ST  
CAMBRIDGE, MA 02139  
CONTRACT NUMBER: DAMD17-89-C-9141  
DR JUDITH P KITCHELL  
TITLE:  
DEVELOPMENT OF A CONTROLLED RELEASE DELIVERY SYSTEM FOR  
IMMUNOGENS  
TOPIC# 81      OFFICE: MEDICAL      IDENT#: 39443

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\*NO ABSTRACT AT THIS TIME

EAGLEMARK INC  
400 CROSS CREEK RD  
AUBURN, AL 36830  
CONTRACT NUMBER:  
JOHN E COCHRAN JR  
TITLE:  
DYNAMIC STABILITY OF FLEXIBLE MISSILES  
TOPIC# 44      OFFICE: MICOM      IDENT#: 34616

AS YET UNIDENTIFIED PHYSICAL MECHANISMS HAVE CAUSED ABRUPT CHANGES IN THE FLIGHT PATHS OF HIGH-SPEED MISSILES WHICH HAVE LARGE LENGTH-TO-DIAMETER RATIOS AND ARE RELATIVELY FLEXIBLE. THESE FLIGHT INSTABILITIES ARE PROBABLY CAUSED BY THE NONLINEAR INTERACTION OF MISSILE VIBRATION AND ROTATION, AERODYNAMIC FORCES AND THE MISSILE'S PROPULSION SYSTEM. TO REAP THE BENEFITS OF THE HIGHER AERODYNAMIC EFFICIENCIES OF MISSILES WITH LARGE LENGTH-TO-DIAMETER RATIOS THEREFORE REQUIRES THAT THE DYNAMIC STABILITY OF FLEXIBLE MISSILES BE BETTER UNDERSTOOD. A RESEARCH PLAN IS PROPOSED WITH THE OBJECTIVES OF IDENTIFYING MECHANISMS WHICH COULD CAUSE MOTION LIKE THAT OBSERVED, MODELING THE MECHANISMS MATHEMATICALLY AND CORRELATING THE RESULTS OF ANALYSES AND SIMULATIONS BASED ON THE MATHEMATICAL MODELS WITH FLIGHT TEST DATA TO DETERMINE WHICH MECHANISM(S) IS (ARE) THE MOST PROBABLY CAUSE(S) OF THE OBSERVED DYNAMIC INSTABILITIES.

ELECTRO MAGNETIC APPLICATIONS INC  
PO BOX 260263  
DENVER, CO 80226  
CONTRACT NUMBER:  
DR RODNEY A PERALA  
TITLE:  
UPDATING CURRENT EMI/EMC TEST METHODS AND EQUIPMENT  
TOPIC# 11      OFFICE: AVSCOM      IDENT#: 33897

THE PROPOSED EFFORT INVOLVES THE REVIEW OF ALL ELEMENTS ASSOCIATED

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WITH TESTING ARMY AIRCRAFT TO EMC/EMI SPECIFICATIONS. THESE ELEMENTS INCLUDE DEFINING THE OPERATING ENVIRONMENTS, IDENTIFYING THE VARIOUS ISSUES ASSOCIATED WITH OPERATING IN THESE ENVIRONMENTS, AND DEVELOPING THE TEST METHODS AND TEST EQUIPMENT REQUIRED TO SIMULATE THE ENVIRONMENTS. THE PRODUCT OF THE PHASE I EFFORT WILL BE THE IDENTIFICATION OF THE MOST PROMISING AND MODERN APPROACHES TO EMI/EMC TESTING AND A DETAILED PLAN TO CONSOLIDATE THE FINDINGS OF THE REVIEW INTO A COMPREHENSIVE TEST PROGRAM THAT WILL BEST SERVE THE ARMY IN QUALIFYING AIRCRAFT AND AIRCRAFT COMPONENTS.

ELECTRO-OPTEK CORP  
3152 KASHIWA ST  
TORRANCE, CA 90505  
CONTRACT NUMBER:  
WILLIAM S CHAN  
TITLE:  
HIGH T<sub>c</sub> SUPERCONDUCTOR ARRAYS FOR SMART SEEKERS  
TOPIC# 1            OFFICE: ARDEC            IDENT#: 33400

THIS EFFORT WILL INVESTIGATE THE CONTROLLED MOLECULAR BEAM EPITAXY (MBE) OF THIN FILM BiSrCaCuO ON A BUFFERED Si SUBSTRATE. THE EPITAXY, AIMED AT IN-SITU CONTROL OF STOICHIOMETRY, WILL BE CARRIED OUT BY USING A BEAM OF ATOMIC OXYGEN GENERATED BY A ELECTRON-CYCLOTRON-RESONANCE (ECR) SOURCE REACTING WITH ATOMIC BEAMS OF Bi, Sr, Ca AND Cu GENERATED BY EFFUSION SOURCES. THE THIN FILM GROWN ON A SPECIALLY ETCHED Si SUBSTRATE WILL FORM AN ARRAY OF SUPERCONDUCTING BOLOMETERS WHICH ARE THEMALLY ISOLATED FROM ONE ANOTHER AND FROM THEIR SURROUNDINGS, MAKING THEM HIGHLY SENSITIVE TO DETECTING INFRARED RADIATION OVER THE ENTIRE INFRARED SPECTRUM OF CURRENT INTEREST. THE BOLOMETER ARRAY CAN BE MONOLITHICALLY COUPLED TO A READOUT CIRCUIT WHICH CAN ALSO BE FABRICATED ON THE SAME Si SUBSTRATE. THE RESULTANT FOCAL PLANE ARRAYS ARE VERY ATTRACTIVE FOR FABRICATING COMPLEX INFRARED SENSOR SYSTEMS.

ELECTROSYNTHESIS CO INC  
PO BOX 430  
EAST AMHERST, NY 14051  
CONTRACT NUMBER:  
DR DUANE J MAZUR  
TITLE:  
SYNTHESIS OF QINGHAOSU ANALOGUES AS POTENTIAL ANTIPARASITIC AGENT  
TOPIC# 74            OFFICE: AMRDC            IDENT#: 34628

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THE SYNTHESIS OF A SERIES OF QINGHAOSU ANALOGUES AS POTENTIAL ANTIPARASITIC AGENTS IS PROPOSED. THESE MATERIALS WILL INCORPORATE THE UNIQUE LACTONE ENDOPEROXIDE FUNCTION ESSENTIAL FOR THE ACTIVITY OF THE PARENT STRUCTURE. THE SYNTHETIC APPROACHES ARE BASED ON WELL-FOUNDED CHEMICAL PRINCIPLES, UTILIZE INEXPENSIVE STARTING MATERIALS, AND SHOULD PROVIDE THE DESIRED COMPOUNDS IN SUFFICIENT QUANTITIES FOR USAMRDC IN VITRO AND IN VIVO BIOLOGICAL EVALUATION. PHASE II WILL EXTEND THESE STUDIES TO DEVELOP EVEN MORE ACTIVE ANALOGUES, AS WELL AS TO PRODUCE LARGER QUANTITIES OF PROMISING COMPOUNDS FOR FURTHER TESTING.

EPITAXX INC  
3490 US RTE 1  
PRINCETON, NJ 08540  
CONTRACT NUMBER:  
DR GREGORY H OLSEN  
TITLE:  
LARGE SIZE (>1cm) InGaAs PHOTODETECTORS FOR 1.3 TO 2.1 um  
TOPIC# 45      OFFICE: MICOM      IDENT#: 34617

WE PROPOSE TO DEVELOP A LARGE-SIZE (>1cm DIAMETER) INDIUM GALLIUM ARSENIDE PHOTODETECTOR WITH HIGH QUANTUM EFFICIENCY (>70%) OUT TO 2.1um FOR FIBER OPTICS, EYESAFE RANGEFINDING, LIDAR AND LASER SEEKING. THESE DEVICES WILL HAVE LOW DARK CURRENTS FOR HIGH 300 DEG K SENSITIVITY ( $D^* \sim 10^{12} \text{cm}^2/\text{Hz}^{1/2}/\text{W}$ ) AND HAVE SPECIAL DEVICE STRUCTURES FOR RISE/FALL TIMES NEAR 10 NANoseconds. EPITAXX IS UNIQUELY QUALIFIED TO PERFORM THIS PROGRAM AS WE CURRENTLY SELL 3mm DIAMETER InGaAs DETECTORS AND HAVE MADE 5mm PROTOTYPES. THE PHASE I EFFORT WILL STUDY THE EFFECT OF InP SUBSTRATE DEFECTS UPON DEVICE PERFORMANCE. CONVENTIONAL EPITAXX InP/In<sub>53</sub>Ga<sub>47</sub>As STRUCTURES FOR 1.0-1.7um WILL BE FABRICATED INTO UNPRECEDENTED SIZES OF 5, 7, AND 10mm DIAMETER - ALL ON A SINGLE 2" InP SUBSTRATE - AND TESTED FOR SENSITIVITY AND SPEED. ONE PROTOTYPE 10mm DEVICE WITH A 20nsec. RISETIME GOAL WILL BE DELIVERED. THE PHASE II EFFORT WILL INCLUDE: i) VAPOR PHASE GROWTH OF In(x)Ga(1-x)As (.53<x<.70) AND InAs(y)P(1-y) (0<y<.3) ALLOYS; ii) FABRICATION OF 5, 7, 10, 15, AND 20mm DIAMETER In<sub>7</sub>Ga<sub>3</sub>AsInAs.<sub>2P.8</sub> DETECTORS FOR 2.1um UPON 3" DIAMETER InP SUBSTRATES; iii) OPTIMIZATION OF LARGE QUADRANT DETECTORS FOR

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2.1um; iv) DELIVERY OF FIVE-15mm AND FIVE-20mm DIAMETER DETECTORS  
FOR 2.1um WITH  $D^* \approx 10(12)\text{cm(Hz)}(1/2/W)$  AT 300 DEG K AND 10-50nsec.  
SPEEDS.

ESSEX CORP  
1040 WOODCOCK RD - STE 227  
ORLANDO, FL 32803  
CONTRACT NUMBER:  
DR ROBERT S KENNEDY  
TITLE:  
CHARACTERIZING SOLDIER RESPONSES TO IRRITANT GASES  
TOPIC# 79      OFFICE: AMRDC      IDENT#: 34633

THE MOST STRAIGHTFORWARD WAY TO MEASURE OPERATIONAL PERFORMANCE IS TO MEASURE IT ON THE JOB. HOWEVER, WHEN SUCH MEASURES ARE EMPLOYED, THEY ARE GENERALLY INSENSITIVE TO ALL BUT THE MOST POWERFUL STRESSOR EFFECTS. ONE OF THE CONTRIBUTING PROBLEMS TO THIS ISSUE IS THE LACK OF RELIABILITY. INSUFFICIENT ATTENTION TO RELIABILITY CAN LEAD TO REDUCTION OF STATISTICAL POWER, HIGHER SAMPLE SIZE REQUIREMENTS, HIGHER COST, AND WHEN HAZARD IS INVOLVED, OTHER PROBLEMS. WE PROPOSE TO DEVELOP A QUANTITATIVE DEFINITION OF SOLDIER PERFORMANCE DEGRADATION DUE TO EXPOSURE TO IRRITANT GASES BY TWO LINKING APPROACHES: SURROGATE MEASURES AND DOSE EQUIVALENCE. SURROGATE MEASURES ARE RELATED TO, OR PREDICTIVE OF, A CONSTRUCT OF INTEREST BUT ARE NOT DIRECT MEASURES. DOSE EQUIVALENCE REFERS TO AN EXPERIMENTAL METHOD WHERE PERFORMANCE DEFICITS PRODUCED WITH A CONTROLLED (AND BENIGN) INDEXING AGENT AND IRRITANT GASES ARE THEN CALIBRATED AGAINST THE AGENT. HUMAN AND ANIMAL DATA WILL BE OBTAINED FROM THE SCIENTIFIC LITERATURE TO THE EXTENT THEY ARE AVAILABLE FOR MOTOR AND REACTION TIME PERFORMANCES. TO QUANTIFY THE HUMAN MENTAL ACUITY FUNCTIONS WHICH ARE RELATED TO MILITARY JOBS, A PORTABLE MICROCOMPUTER MENU OF TESTS WILL BE EMPLOYED. IN PHASE I A PRACTICAL DEMONSTRATION WILL BE PERFORMED TO AN IRRITANT GAS OR OTHER SUITABLE AGENT.

FLOW ANALYSIS INC  
256 - 93RD ST  
BROOKLYN, NY 11209  
CONTRACT NUMBER:  
JOHN STEINHOFF  
TITLE:  
A VORTEX EMBEDDING METHOD FOR THE COMPUTATION OF HELICOPTER ROTOR FLOWS INCLUDING CLOSE BLADE - VORTEX INTERACTIONS  
TOPIC# 17      OFFICE: AVSCOM      IDENT#: 33901

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THE DEVELOPMENT OF A COMPUTER CODE TO SOLVE FOR THREE DIMENSIONAL FLOW OVER HELICOPTER ROTORS, INCLUDING CLOSE BLADE-VORTEX INTERACTIONS IS PROPOSED. THE METHOD INVOLVES A PREVIOUSLY DEVELOPED GRID-BASED FREE WAKE "VORTEX EMBEDDING" TECHNIQUE FOR TREATING VORTICITY TRANSPORT THROUGH MOST OF THE FLOW, AND A MODIFIED FINITE DIFFERENCE NAVIER-STOKES METHOD FOR THE REGION CLOSE TO THE BLADES. THE TWO METHODS USE THE SAME COMPUTATIONAL GRID, AND ARE SHOWN TO BE VERY SIMILAR. THIS SIMILARITY IS USED TO EFFECT A SMOOTH TRANSITION BETWEEN THEM, AND OBTAIN A UNIFIED SOLUTION METHOD. IN THIS UNIFIED SCHEME, THE VORTEX SHEETS SHED BY THE BLADES PROPAGATE WITHOUT NUMERICAL DIFFUSION THROUGH A RELATIVELY COARSE, ECONOMICAL GRID, MAINTAINING A FIXED INTERNAL STRUCTURE (USING THE EMBEDDING METHOD) AND CAN INTERACT WITH THE BLADES AT ANY DISTANCE, INCLUDING HEAD-ON INTERSECTION. DURING THE INTERACTION, DEFORMATIONS OF THE VORTEX AS WELL AS THE INFLUENCE ON THE BLADE BOUNDARY LAYER ARE TREATED USING THE NAVIER-STOKES EQUATIONS. A MODULAR APPROACH IS PROPOSED WHERE A NAVIER-STOKES ROUTINE AND A SPECIAL TRANSITION ROUTINE ARE TO BE DEVELOPED AND COUPLED TO OUR EXISTING VORTEX EMBEDDING CODE. FUTURE MODIFICATIONS OF THE EMBEDDING CODE WILL BE READILY ADAPTABLE TO THE PROPOSED MODULES.

FOSTER-MILLER INC  
350 SECOND AVE  
WALTHAM, MA 02254  
CONTRACT NUMBER:  
ANTHONY A APONICK  
TITLE:

HIGH TEMPERATURE SUPERCONDUCTING (1-2-3) MILLIMETER WAVE MIXER  
TOPIC# 26      OFFICE: ETDL      IDENT#: 33404

HIGH TEMPERATURE SUPERCONDUCTING (HTSC) MIXERS CAN OFFER LOW-NOISE PERFORMANCE WITH GAIN AT FREQUENCIES APPROACHING 100 GHz. IF GAIN CAN BE ACHIEVED, CONVERSION LOSSES OF 2 dB CAN BE APPROACHED. THE USE OF HTSC MATERIALS OFFERS DRASTIC REDUCTION OF THE PROBLEMS IN COOLING WHEN COMPARED WITH LOW TEMPERATURE CIRCUITS, BUT THEY PRESENT CHALLENGES BECAUSE THE PRESENTLY AVAILABLE QUALITY OF THE NONLINEAR MIXING ELEMENT DOES NOT APPROACH THAT OF THEIR LOW TEMPERATURE COUNTERPARTS. IN PHASE I OF THIS EFFORT, WE PROPOSE TO TAKE

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ADVANTAGE OF ONGOING WORK ON OTHER PROGRAMS TO OBTAIN HTSC JUNCTIONS WITH IMPROVED CHARACTERISTICS AND TO OBSERVE THE CONVERSION EFFICIENCY THEY OFFER AT FREQUENCIES UP TO 3 GHz. THE SPECIFICATIONS WILL BE EXTENDED DURING PHASE II TO CONVERSION LOSSES APPROACHING 2 dB AT FREQUENCIES APPROACHING 100 GHz. THIS IS A TEAM EFFORT, WITH RF EVALUATIONS BEING CONDUCTED BY MICRILOR, INC. (ALSO A SMALL BUSINESS) AND MATERIALS BEING PROVIDED BY E.I. duPONT de NEMOURS AND COMPANY.

FOSTER-MILLER INC  
350 SECOND AVE  
WALTHAM, MA 02254  
CONTRACT NUMBER:  
DAVID EVANS

TITLE:

THERMOPLASTIC COMPOSITE HELICOPTER TAILBOOM FABRICATION USING  
ULTRASONICALLY HEATED FILAMENT WINDING

TOPIC# 16      OFFICE: AVSCOM      IDENT#: 33900

ADVANCED AIRFRAME STRUCTURES REQUIRE COMPOSITE COMPONENTS TO MEET WEIGHT LIMITATIONS AND PERFORMANCE REQUIREMENTS. THERMOPLASTIC COMPOSITES ARE CANDIDATE MATERIALS BECAUSE OF THEIR EXCELLENT SPECIFIC STRENGTH, MODULUS, AND INTERLAMINAR FRACTURE TOUGHNESS. ONE STEP FABRICATION METHODS WHICH INCORPORATE FIBER PLACEMENT AND CONSOLIDATION ARE FEASIBLE WITH THERMOPLASTIC MATERIALS. THIS PROPOSED PROGRAM OFFERS A UNIQUE CONCEPT THAT USES FILAMENT WINDING IN CONJUNCTION WITH ULTRASONIC HEATING TO ACHIEVE ONE STEP FABRICATION OF THERMOPLASTIC COMPOSITES. A SAMPLE COMPONENT WILL BE FABRICATED IN PHASE I TO DEMONSTRATE COST EFFICIENCY, COMPONENT QUALITY, AND APPLICABILITY TO FULL SCALE TAILBOOM COMPONENTS REQUIRED IN PHASE II.

GENERAL TECHNOLOGY INC  
500 NORCROSS WY  
SILVER SPRING, MD 20904  
CONTRACT NUMBER: DACA33-89-C-0048  
S C LING

TITLE:

OPTICAL INSTRUMENT FOR MEASURING THE MASS CONCENTRATION OF SOLID PARTICLES SUSPENDED IN AIR

TOPIC# 65      OFFICE: CRREL      IDENT#: 33908

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VERY RECENTLY, AN OPTICAL INSTRUMENT FOR MEASURING SIZES AND CONCENTRATIONS OF SPHERICAL PARTICLES IN A PIPELINE HAS BEEN DEVELOPED BY THE PRINCIPAL INVESTIGATORS. BASED ON THIS EXPERIENCE, WE PROPOSE TO INVESTIGATE THE FEASIBILITY OF DEVELOPING A RELIABLE OPTICAL PARTICLE INSTRUMENT WHICH WILL MEET THE FOLLOWING REQUIREMENTS: (1) IT CAN MEASURE SPATIAL AND TEMPORAL DISTRIBUTIONS OF PARTICLE VELOCITY, SIZE, AND MASS FLUX IN A GAS-SOLID SUSPENSION FLOW; (2) ACCURATE MEASUREMENTS CAN BE MADE FOR SMALL PARTICLES WITH A CONCENTRATION OF UP TO 500 PARTICLES/cm(3) OR APPROXIMATELY 500 GRAM/m(3) FOR SNOW POWDER; (3) THE DETECTION CROSS-SECTIONAL AREA AND VOLUME CAN BE ADJUSTED TO OPTIMIZE ANY MEASUREMENT REQUIREMENTS; (4) THE LOCATION OF THE SENSING VOLUME CAN BE EASILY CHANGED SO THAT LOCAL PROPERTIES OF FLOW CHARACTERISTICS AT VARIOUS POINTS CAN BE MEASURED. THUS THE INSTRUMENT CAN BE USED FOR MEASUREMENTS IN WIND TUNNELS; (5) IT CAN BE USED FOR FIELD MEASUREMENTS UNDER COLD AND WINDY WEATHER CONDITIONS. THE PHASE I WORK WILL PROVIDE A GOOD FOUNDATION FOR FURTHER INTEGRATION OF THE SYSTEM INTO A HIGHLY RELIABLE AND ACCURATE PARTICLE INSTRUMENT WITH SPECIAL APPLICATIONS TO ARMY NEEDS.

GEOPEX LTD  
605 MERCURY ST  
RALEIGHT, NC 27603  
CONTRACT NUMBER: DACA88-89-C-0013

I J WON

TITLE:

DEVELOPMENT OF A PORTABLE ELECTROMAGNETIC SENSOR FOR DETECTING METALLIC OR NONMETALLIC UNDERGROUND STORAGE TANKS

TOPIC# 60      OFFICE: CERL      IDENT#: 35279

WE PROPOSE TO DEVELOP A HAND-HELD ELECTROMAGNETIC SENSOR FOR DETECTING METALLIC OR NONMETALLIC UNDERGROUND STORAGE TANKS (UST'S). EXISTING CASE HISTORIES INDICATE THAT THE SENSOR SHOULD ALSO BE ABLE TO MAP THE CONTAMINANT PLUMES IN THE SOIL, AND POSSIBLY, FREE PRODUCTS FLOATING ABOVE THE GROUND WATER. DURING THE PAST SEVERAL YEARS, GEOPEX HAS PIONEERED IN DEVELOPING A NEW GENERATION AIRBORNE ELECTROMAGNETIC SENSOR THAT IS USED FOR MAPPING GROUND CONDUCTIVITY FEATURES. GEOPEX HAS DEVELOPED ALL HARDWARE AND INTERPRETATION

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SOFTWARE FOR THE SYSTEM. PRESENTLY, GEOPHEX IS THE ONLY FIRM IN THE U.S. ENGAGED IN PRODUCING AIRBORNE ELECTROMAGNETIC SENSORS FOR THE PURPOSE OF EXPLORING THE EARTH. UNDER THIS SBIR PROPOSAL, WE WISH TO DEVELOP, ESSENTIALLY, A MINIATURIZED VERSION OF OUR AIRBORNE EM UNIT AND A PACKAGE OF INTERPRETATION SOFTWARE SPECIFICALLY FOR UST'S.

GREEN MOUNTAIN RADIO RESEARCH CO  
50 VERMONT AVE - FT ETHAN ALLEN  
WINOOSKI, VT 05404  
CONTRACT NUMBER: DAAB07-89-C-0038  
FREDERICK H RAAB

TITLE:  
FEASIBILITY STUDY FOR INTEGRATED ANTENNA-AMPLIFIER NETWORK  
TOPIC# 56 OFFICE: CECOM-E/W IDENT#: 34623

OPERATION OF A JAMMER TRANSMITTER FROM A SMALL PLATFORM (RPV OR JEEP) NECESSITATES THE USE OF ELECTRICALLY SHORT ANTENNAS SUCH AS SHORT WHIPS AND SMALL LOOPS. THE CONVENTIONAL APPROACH USES A POWER AMPLIFIER DESIGNED FOR A 50-OHM LOAD AND AN ANTENNA TUNER THAT MATCHES THE ANTENNA-INPUT IMPEDANCE TO OHMS. HOWEVER, THE RAPID FREQUENCY CHANGES REQUIRED BY JAMMERS PRECLUDE THE USE OF ANTENNA TUNING. THE PROPOSED PROGRAM IS A FEASIBILITY STUDY AND SYSTEM DESIGN FOR A NOVEL APPROACH THAT INTEGRATES THE POWER AMPLIFIER (PA), ANTENNA, AND MATCHING NETWORK. THE ANTENNA ITSELF IS OPTIMIZED TO THE EXTENT POSSIBLE (GIVEN SIZE CONSTRAINTS) FOR MINIMUM VSWR. THE FILTER/MATCHING NETWORK ATTENUATES HARMONICS FROM THE PA AND BRINGS THE VSWR TO A REASONABLE LEVEL (E.G., <2:1) WITHIN ITS FREQUENCY BAND. A PIN-DIODE NETWORK SELECTS THE APPROPRIATE FILTER/MATCHING NETWORK FOR THE FREQUENCY OF OPERATION. AN OVERRATED PA DELIVERS THE SPECIFIED POWER INTO THE APPROXIMATELY MATCHED LOAD IMPEDANCE. THE FET PA ACHIEVES MAXIMUM EFFICIENCY BY OPERATING IN CLASS D AT HF AND SATURATED CLASS C AT VHF. A SWITCHING REGULATOR AND CONTROL UNIT MAINTAIN THE SPECIFIED OUTPUT POWER AND MAXIMUM EFFICIENCY IN SPITE OF VARIATIONS IN ITS LOAD IMPEDANCE.

GUMBS ASSOCS INC  
11 HARTS LN  
E BRUNSWICK, NJ 08816  
CONTRACT NUMBER:  
DR P CHANDRA SEKHAR

TITLE:  
ULTRAFAST BROAD-BAND PASSIVE LASER SHIELDS BASED ON NOVEL SEMICONDUCTOR/CONDUCTING POLYMER INTERFACE TECHNOLOGY  
TOPIC# 83 OFFICE: AMRDC IDENT#: 34870

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A NOVEL TECHNOLOGY FOR FABRICATION OF BROAD-BAND, DYNAMIC (SWITCHABLE), PASSIVE, ULTRAFast (SUBNANOSECOND RISE AND FALL TIMES) LASER SHIELDS IS PROPOSED, BASED ON INTERFACING SEMICONDUCTOR (SC) ELECTRODES TO CONDUCTING POLYMERS (CPs). THE CP NORMALLY SWITCHED FROM A TRANSPARENT TO AN OPAQUE STATE ELECTROCHEMICALLY, IS SWITCHED BY THE SC ON LASER PHOTOACTIVATION, WHICH PROVIDES BOTH THE TRIGGER AND THE EMF FOR SWITCHING. THE SWITCHING RATE-LIMITING PROCESS IS CHARGE TRANSFER ACROSS THE SC/CP INTERFACE, WITH AN RC TIME CONSTANT BASED ON ACTUAL MEASUREMENTS OF 100 PSEC - 1 NSEC, AND CHARGE CONDUCTION WITHIN THE POLYMER, ALSO VERY RAPID. PRELIMINARY DATA (RESULTS PRESENTED HEREIN) SHOW EMINENTLY THE FEASIBILITY OF THE METHOD. A MULTIDISCIPLINARY APPROACH IS PROPOSED WITH MAJOR EXPERIMENTS AT THE STATE-OF-THE-ART PICOSECOND LASER FACILITIES OF THE REGIONAL LASER AND BIOTECHNOLOGY LABORATORIES (RLBL), U. OF PA., PHILADELPHIA, WITH WHICH GUMBS HAS AN ONGOING RELATIONSHIP. EXTENSIVE OTHER CONTRACTUAL WORK AT GUMBS IN LASER SHIELDS STRENGTHENS THE PROPOSAL. SWITCHING AT INTENSITIES JUST ABOVE THE MAXIMUM PERMISSIBLE EXPOSURES (MPES) IS SHOWN TO OCCUR.

HAWAII BIOTECHNOLOGY GP INC  
99-193 AIEA HEIGHTS DR

AIEA, HI 96701  
CONTRACT NUMBER:  
DR JOHN M IVY

TITLE:  
PRODUCTION OF DENQUE 2 ENVELOP PROTEIN IN THE YEAST SACCHAROMYCES  
CEREVISIAE  
TOPIC# 70      OFFICE: AMRDC      IDENT#: 34624

THE FOUR SEROTYPES OF DENGUE VIRUSES ARE A LEADING CAUSE OF MORBIDITY THROUGHOUT THE TROPICS AND SUBTROPICS. FOR USE IN DIAGNOSTICS AND IN SUBUNIT VACCINES AGAINST DENGUE, A RELIABLE AND INEXPENSIVE SOURCE OF DENGUE ANTIGENS IS REQUIRED. FOR THESE PURPOSES, EXPRESSION OF RECOMBINANT ANTIGENS IN MICROORGANISMS IS BEST SUITED. WE PROPOSE TO USE THE YEAST SACCHAROMYCES CEREVISIAE TO PRODUCE THE DENGUE 2 VIRUS ENVELOPE GLYCOPROTEIN. THE SEQUENCES ENCODING THE ENVELOP PROTEIN WILL BE PLACED UNDER THE TRANSCRIPTIONAL CONTROL OF BOTH A CONSTITUTIVE AND A REGULATED PROMOTER, WITH AND WITHOUT SECRETION

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SIGNAL PEPTIDES. RELATIVE AMOUNTS OF ANTIGENIC MATERIAL WILL BE DETERMINED FOR EACH SYSTEM.

HOLOMETRIX INC  
99 ERIE ST  
CAMBRIDGE, MA 02139  
CONTRACT NUMBER:  
DR JUDITH P KITCHELL  
TITLE:  
DEVELOPMENT OF A CONTROLLED RELEASE DELIVERY SYSTEM FOR IMMUNOGEN  
TOPIC# 81      OFFICE: AMRDC      IDENT#: 34866

IN MANY INSTANCES, THE EFFECTIVENESS OF A VACCINE LARGELY DEPENDS ON MULTIPLE INOCULATIONS. IN ORDER TO ACHIEVE A HIGH DEGREE OF PROTECTIVE IMMUNITY, "BOOSTER" IMMUNIZATIONS ARE OFTEN REQUIRED. IMMUNIZATION OF LARGE NUMBERS OF PEOPLE, THEREFORE, PRESENTS A LOGISTICS PROBLEM. THE PROPOSED DELIVERY SYSTEM EMPLOYS THE USE OF POLY(LACTIC/GLYCOLIC) ACID (PLGA). VACCINE PREPARATIONS COULD BE INCORPORATED IN THE PLGA COPOLYMER AS MICROPARTICLES AND ADMINISTERED INTRAMUSCULARLY FOR IMMUNIZATION AGAINST A NUMBER OF PARASITIC, VIRAL, AND BACTERIAL INFECTIONS. IN THIS NOVEL SYSTEM, SOME OF THE MICROPARTICLES WOULD IMMEDIATELY RELEASE VACCINE OVER A PERIOD OF THREE TO SEVEN DAYS; OTHER MICROPARTICLES PRESENT IN THE INITIAL INJECTION WOULD HAVE A DELAYED RELEASE CHARACTERISTIC (TWO TO FOUR WEEKS), AND WOULD FINALLY RELEASE THEIR BOUND VACCINE MATERIAL ALSO OVER THREE TO SEVEN DAY PERIOD, SIMULATING A SECOND VACCINE INJECTION. THE PRIMARY GOAL OF PHASE I WILL BE TO DEVELOP A MODEL PROTEIN FORMULATION WHICH RELEASES THE PROTEIN IN AN UNALTERED STATE, WITH AN OPTIMAL RELEASE PATTERN FOR STIMULATING IMMUNOGENICITY, AND WHICH HAS AN OPTIMAL ADJUVANT EFFECT.

IAP RESEARCH INC  
2763 CULVER AVE  
DAYTON, OH 45429  
CONTRACT NUMBER:  
DR JOHN P BARBER  
TITLE:  
ENHANCEMENT OF SHAPED CHARGE JET BREAKUP PERFORMANCE WITH AXIAL MAGNETIC FIELDS  
TOPIC# 25      OFFICE: BRL      IDENT#: 33403

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WE ARE PROPOSING TO EVALUATE THE FEASIBILITY OF USING AXIALLY INDUCED MAGNETIC FIELDS TO LIMIT SHAPED CHARGE JET BREAKUP. WE WILL DETERMINE THE MAGNETIC FLUX REQUIREMENTS FOR LIMITING THE JET BREAKUP OF 66 mm VIPER SHAPED CHARGE DEVICES. WE WILL DESIGN AND FABRICATE A STATIC FLUX COIL TO AXIALLY INDUCE FIELDS FROM 10-30 TESLA (T) ALONG THE AXIS OF THE FUNCTION JET. THE EFFECT OF BREAKUP WILL BE QUANTIFIED VIA FLASH X-RAY TECHNIQUES.

IMATRON INC  
389 OYSTER POINT BLVD  
S SAN FRANCISCO, CA 94080  
CONTRACT NUMBER:  
DR KRISTIAN R PESCHMANN  
TITLE:  
CONTINUOUS HIGH POWER X-RAY TUBE  
TOPIC# 84      OFFICE: AMRDC      IDENT#: 34871

THE MANAGEMENT OF MASS CASUALTY SITUATIONS FROM NATURAL DISASTERS, MAJOR ACCIDENTS, OR WARFARE IS JEOPARDIZED BY THE SHORTCOMINGS OF EXISTING X-RAY TUBES USED IN MEDICAL (DIAGNOSTIC) IMAGING: LESS THAN 12% DUTYCYCLE, SHORT LIFE, EXTREME FRAGILITY. THIS PROPOSAL SUGGESTS THE SOLUTION IN FORM OF A NOVEL ROTATING X-RAY TUBE WITH 100% DUTY-CYCLE EVEN UNDER FULL LOAD. THE TUBE IS ALSO EXTREMELY RUGGED BECAUSE IT DOES NOT CONTAIN A CATILEVERED ANODE ARRANGEMENT NOR HEAT SENSITIVE BEARINGS. THE TUBE ALSO HAS THE BUILTIN CAPABILITY OF SCANNED FOCUS POSITION. WITH THIS CONTINUOUS HIGH POWER OUTPUT X-RAY TUBE, CONTAINING TWO DISCRETE FOCUS POSITIONS, THE SPATIAL RESOLUTION OF SCANNED PROJECTION IMAGING CAN BE DRASTICALLY INCREASED AND THE REPLACEMENT OF SILVER-BASED FILM IN PROJECTION IMAGING BECOMES A REALISTIC POSSIBILITY. UNLIKE OTHER SUGGESTED SOLUTIONS THIS TUBE IS HERMETICALLY SEALED, REQUIRES NO LIQUID-BASED OR OTHER VACUUM SEALS, NOR A VACUUM PUMP.

INFORMATION SYSTEMS TECHNOLOGY INC  
413 E 61ST ST  
CLARENDON HILLS, IL 60514  
CONTRACT NUMBER:  
J SANIIE/M VOLK/M BILGUTA  
TITLE:  
IMPROVED ULTRASONIC INSPECTION SYSTEM USING MULTIBIT DIGITAL SIGN CORRELATORS  
TOPIC# 31      OFFICE: BRDC      IDENT#: 34875

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A MAJOR AND PRESSING PROBLEM IN NONDESTRUCTIVE EVALUATION (NDE) OF MATERIAL USING ULTRASOUND IS THE DETECTION OF MICROSTRUCTURAL ECHOES OF LOW SIGNAL-TO-NOISE RATIO (SNR). THE LOSS OF SIGNAL BY SCATTERING AND ABSORPTION IMPOSES A LIMIT ON THE DETECTION CAPABILITY OF ULTRASONIC SYSTEMS. THIS PROBLEM OFTEN ARISES IN EXAMINING COMPOSITES, CERAMICS, CAST COMPONENTS, WELDS OR ANY THICK SECTION OF MATERIALS. ONE METHOD OF OBTAINING HIGH SNR IS THE APPLICATION OF A CORRELATION RECEIVING SYSTEM. IN PHASE I OF THIS RESEARCH PROPOSAL, WE PROPOSE TO DEVELOP AND EVALUATE AN ULTRASONIC INSPECTION SYSTEM USING GOLAY CODES AND MULTIBIT SIGNAL CORRELATORS. THIS SYSTEM TRANSMITS LARGE TIME-WIDTH RADOM CODES AND ACHIEVES PULSE COMPRESSION THROUGH THE CORRELATOR WHICH RESULTS IN TREMENDOUS SNR. THE HARDWARE DESIGN WILL INCLUDE FEATURES TO EASE INTERFACING THE CORRELATOR SYSTEM WITH THE PC-BASED WORKSTATION FOR POST-PROCESSING THE ACQUIRED DATA. IT IS OUR OBJECTIVE TO EVALUATE THE ABILITY OF THE CORRELATOR TO CHARACTERIZE THE STRUCTURE OF COMPOSITES AND OTHER MATERIALS OF IMPORTANCE TO DOD.

INNOVATIVE RESEARCH INC

6735 E SIXTH AVE

DENVER, CO 80220

CONTRACT NUMBER:

MOHSEN PAZIRANDEH

TITLE:

AN ENVIRONMENT FOR SIMULATION MODELING OF DISTRIBUTED SYSTEMS

TOPIC# 85      OFFICE: AIRMICS      IDENT#: 33421

THE DEVELOPMENT OF SIMULATION MODELS OF A DISTRIBUTED SYSTEMS AND THEIR MAPPING INTO A PARALLEL SYSTEM, IS A HIGHLY COMPLEX TECHNICAL TASK BECAUSE OF THE GREAT INFLUENCE ITS VARIOUS ELEMENTS WILL HAVE ON ITS PERFORMANCE. THERE ARE MAJOR TECHNICAL ISSUES INVOLVED IN PERFORMING SUCH COMPLEX SIMULATION EFFORT, INCLUDING UNIQUE REQUIREMENTS SIMULATION MODELS, VARIED ARCHITECTURAL CONCEPTS OF DISTRIBUTED SYSTEMS, AND THE NUMBER OF OPTIONS WE HAVE AVAILABLE FOR MAPPING AN APPLICATION INTO A PARALLEL SYSTEM. THE BEST WAY TO PERFORM THIS COMPLEX TASK IS TO DEVELOP AN ENVIRONMENT COMPOSED OF ALL NEEDED TOOLS, ALGORITHMS, AND RESOURCES. FLEXIBILITY AND MODULARITY ARE CRUCIAL FEATURES OF SUCH AN ENVIRONMENT AS A NUMBER OF HETEROGENEOUS

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ENTITIES NEED TO BE SIMULATED, INCLUDING: OPERATIONAL SCENARIOS, APPLICATIONS, AND ARCHITECTURES. FOR THE PHASE I OF THIS RESEARCH, WE WILL DEFINE THE REQUIREMENTS FOR SUCH AN ENVIRONMENT AND PROVE THE FEASIBILITY VIA A PROOF OF CONCEPT EXAMPLE. THE ACTUAL DEVELOPMENT OF THE ENVIRONMENT WILL BE A PHASE II OBJECTIVE.

INTERNATIONAL SOFTWARE SYSTEMS INC  
9420 RESEARCH BLVD - STE 200  
AUSTIN, TX 78759  
CONTRACT NUMBER: DAAB07-89-C-B922  
WILLIAM GILMORE  
TITLE:  
REQUIREMENTS ENGINEERING TECHNOLOGY  
TOPIC# 54      OFFICE: CECOM-S/E      IDENT#: 34621

IN ORDER TO SUCCESSFULLY ESTABLISH A REQUIREMENTS LIFE CYCLE WITH A DISTINCT SET OF ARCHITECTED PRODUCTS, IT IS ESSENTIAL THAT A FOUNDATION FOR TOOLS EXIST. WE PROPOSE TO RESEARCH AND CREATE A HIGH LEVEL DESIGN FOR A COMPREHENSIVE INTEGRATION PLATFORM FOR REQUIREMENTS ENGINEERING ENVIRONMENTS (REEs). IN ORDER TO PROVIDE THE RIGHT LEVEL OF SUPPORT FOR THE MANY STAKEHOLDERS WHO SHOULD USE THIS ENVIRONMENT, EXTENSIVE INVESTIGATION OF THE EXISTING REQUIREMENTS APPROACHES, TOOLS, AND ASSOCIATED LITERATURE WILL BE CARRIED OUT. THE PLATFORM WILL SUPPORT AT LEAST TWO DIFFERENT REPRESENTATIONS OF THE SYSTEM: CONCEPTUAL MODELS AND THE REQUIREMENTS SPECIFICATIONS, AND ASSOCIATED TOOLS AND ACTIVITIES. WE WILL INVESTIGATE WHETHER THE SYSTEM SPECIFICATION AND THE SYSTEM ITSELF SHOULD ALSO BE SUPPORTED, OR SIMPLY INTERFACE WITH VIA IMPORT/EXPORT. THESE MAY INCLUDE EARLY CONCEPT CAPTURE, EXPLORATION, PROTOTYPING, VIEW CONFLICT DETECTION AND RESOLUTION, AND REQUIREMENTS CONSOLIDATION, SEMANTIC CHECKING, AND CATEGORIZATION. KNOWLEDGE BASES THAT SUPPORT APPLICATION DOMAIN KNOWLEDGE, REUSE, TAILORING OF PROCESS MODELS TO SYSTEM AND REQUIREMENTS CHARACTERISTICS, AND PROJECT MANAGEMENT WILL BE STUDIED FOR THEIR IMPACT ON THE DATABASE REQUIREMENTS ASPECT OF THE PLATFORM. OTHER CAPABILITIES TO BE SUPPORTED ARE: BROWSING, SCENARIO CAPTURE, TEST CASE GENERATION, VERIFICATION AND VALIDATION, CROSS REFERENCING, TRACING, DETAILED EXAMINATION, AND OUTSIDE INTERFACES. THE PROPOSAL EXPLAINS IN DETAIL THE APPROACH TO BE EMPLOYED TO RESEARCH THE REQUIREMENTS OF THE INTEGRATION PLATFORM AND UNDERLYING DATABASE.

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THE OUTCOME OF THE INVESTIGATION WILL BE A REPORT OF THIS RESEARCH,  
AND A HIGH LEVEL DESIGN OF A REE PLATFORM.

ISM TECHNOLOGIES INC  
9965 CARROLL CANYON RD  
SAN DIEGO, CA 92131  
CONTRACT NUMBER:  
JAMES R TREGGIO  
TITLE:  
CERAMIC COATINGS FOR ORGANIC MATRIX COMPOSITES  
TOPIC# 10      OFFICE: AVSCOM      IDENT#: 33895

A NUMBER OF TECHNIQUES HAVE BEEN DEVELOPED TO COAT ORGANIC MATRIX COMPOSITES, SUCH AS CHEMICAL VAPOR DEPOSITION (CVD) AND PHYSICAL VAPOR DEPOSITION (PVD). HOWEVER, WHILE COATINGS CAN BE PRODUCED BY THESE CONVENTIONAL COATING TECHNIQUES, THE COATING SUFFER FROM A NUMBER OF PROBLEMS, INCLUDING POOR ADHERENCE AND LOW DENSITY, SUCH THAT THEY ARE MARGINAL FOR PRACTICAL APPLICATIONS ON ORGANIC MATRIX COMPOSITES FOR EROSION RESISTANCE IN TURBINE COMPRESSOR APPLICATIONS. ISM HAS DEVELOPED A PROPRIETARY TECHNIQUE OF PRODUCING COATINGS ON ORGANIC MATRIX COMPOSITES THAT PROVIDE VERY SUBSTANTIAL RESISTANCE TO EROSION FOR TURBINE COMPRESSOR APPLICATIONS, INCLUDING BLADES. THE ISM PROCESS WILL PRODUCE TIGHTLY ADHERING, HIGH DENSITY CERAMIC COATINGS WITHOUT EXCESSIVE HEATING OF TURBINE COMPONENTS. MOREOVER, ISM CAN SCALE THE PROCESS UP TO PRODUCTION LEVEL THROUGHPUTS.

KEA INDUSTRIES  
2080 EXPERIMENT FARM RD  
TROY, OH 45373  
CONTRACT NUMBER:  
ALBERT E KATZER  
TITLE:  
THE ASSESSMENT OF THE TECHNICAL REQUIREMENTS OF A CLOSED BLOOD HANDLING SYSTEM USING A TRI-ENZYME ENZYMES FOR A HIV ASSAY  
TOPIC# 72      OFFICE: AMRDC      IDENT#: 34627

THE PROPOSED RESEARCH IS ORIENTED TO INVESTIGATE WHAT NEEDS TO BE

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IDENTIFIED IN THE ADAPTATION OF A CLOSED BLOOD HANDLING DEVICE AND TESTING VEHICLE FOR HIV ASSAY UTILIZING ELISA MULTI-ENZYME AND/OR RECOMBINANT DNA METHODS. THIS PROGRAM WILL ASSESS THE TECHNICAL REQUIREMENTS TO DEVELOP THIS CLOSED BLOOD HANDLING DEVICE AS WELL AS THE ENCAPSULATION OF THE MULTI-ENZYMES WITHIN THE CLOSED SYSTEM AND ADAPTING THE DEVICE TO MDI'S "PRE-DONOR SCREEN SYSTEM."

KLEIN ASSOCS INC  
PO BOX 264 - 800 LIVERMORE ST  
YELLOW SPRINGS, OH 45387

CONTRACT NUMBER:

LESLIE A WHITAKER

TITLE:

EFFECT OF SPEECH INTELLIGIBILITY ON PERFORMANCE TESTING IN AN OPERATIONAL SETTING

TOPIC# 28

OFFICE: HEL

IDENT#: 33407

RESEARCH IS PROPOSED WHICH WILL TEST THE EFFECT OF SPEECH INTELLIGIBILITY LEVELS ON PERFORMANCE ON AN INFANTRY TASK. THE RESEARCH WILL BE CONDUCTED IN THE FIELD AND WILL USE HOSTAGE, ATTACK, OR DEFENSE SCENARIOS. SPEECH INTELLIGIBILITY WILL BE CONTROLLED THROUGH THE USE OF A FILTERING CIRCUIT WHICH ALLOWS FINE-TUNING OF INTELLIGIBILITY FOR EACH SOLDIER. THE MODIFIED RHYMING TEST WILL BE USED TO CALIBRATE INTELLIGIBILITY LEVELS. THE DEPENDENT MEASURES WILL BE SCENARIO TASK PERFORMANCE AND SUBJECTIVE MENTAL WORKLOAD. THE GOAL OF THIS PROJECT IS TO DEVELOP A MODEL WHICH PREDICTS HOW INTELLIGIBILITY AFFECTS PERFORMANCE AS A FUNCTION OF TASK REQUIREMENTS. PHASE I WILL DETERMINE THE FEASIBILITY OF FIELD TESTING THIS CONCEPT AND PROVIDE AN ELEMENTARY MODEL TO PREDICT THIS PERFORMANCE.

LEARNING ENVIRONMENTS INC  
710 N GRANT ST  
WEST LAFAYETTE, IN 47906

CONTRACT NUMBER:

ROBERT W LAWLER

TITLE:

PROLOG LINGER LEARNING ENVIRONMENTS

TOPIC# 66

OFFICE: ARI

IDENT#: 33417

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WE WILL INSTALL LOGIC PROGRAMMING ASSOCIATES PROLOG ON A MACINTOSH II. WITHIN THIS SOFTWARE ENVIRONMENT, WE WILL CREATE A PROLOG PORT OF LINGER (A LANGUAGE INDEPENDENT GRAMMAR ERROR REPORTER), A EUROPEAN KNOWLEDGE BASED SYSTEM SHELL FOR LANGUAGE INSTRUCTION. THE SPECIFIC GOAL WILL BE TO DEVELOP A SYSTEM USABLE FOR INSTRUCTION IN SPANISH GRAMMAR. THIS IMPLIES WE WILL NEED TO CREATE A SPANISH INSTRUCTION DATABASE FOR USE WITH THE LINGER SHELL. IN PARALLEL WITH THE PROJECT TO PORT LINGER, WE WILL DESIGN A HYPERCARD "FRONT END" FOR THIS SYSTEM.

MARROW-TECH INC  
100 GRASSLANDS RD  
ELMSFORD, NY 10523  
CONTRACT NUMBER:  
DR GAIL K NAUGHTON

TITLE:

A NOVEL SYSTEM FOR TESTING DERMAL AND EPIDERMAL TOXICITY IN VITRO  
TOPIC# 77      OFFICE: AMRDC      IDENT#: 34630

A THREE-DIMENSIONAL HUMAN SKIN MODEL HAS BEEN DEVELOPED IN OUR LABORATORY AND IS BEING CHARACTERIZED AND MODIFIED FOR USE IN CYTOTOXICITY ASSAYS, CHEMICAL PENETRATION STUDIES, AND ENGRAFTMENT STUDIES, AS A TARGET TISSUE IN DRUG MECHANISM STUDIES, AND AS A SOURCE FOR VARIOUS NATURALLY-SECRETED GROWTH FACTORS. THE MODEL CONSISTS OF A DERMAL LAYER OF FIBROBLASTS AND NATURALLY SECRETED COLLAGEN AND AN EPIDERMAL LAYER OF MELANOCYTES AND KERATINOCYTES. A DERMAL/EPIDERMAL JUNCTION IS PRESENT. THE SKIN MODEL INVOLVES USE OF A COMPLETELY MANIPULABLE MESHWORK AND REPRESENTS A MODEL SIMILAR TO THE IN VIVO SYSTEM IN TERMS OF CELL-CELL INTERACTIONS, NATURALLY SECRETED MATRIX PROTEINS, PIGMENT PRODUCTION, SECRETION AND STORAGE, AND CELL MATURATION AND KERATINIZATION. THIS CULTURE METHOD IS INEXPENSIVE, DURABLE, NON-ANTIGENIC, NON-TOXIC, AND ALLOWS EXCELLENT CELL ADHERENCE. IT IS THE ONLY SKIN MODEL CURRENTLY AVAILABLE IN WHICH DERMAL FIBROBLASTS REMAIN MITOTICALLY AND METABOLICALLY ACTIVE IN VITRO WHILE ACTIVELY SUPPORTING THE GROWTH AND DIFFERENTIATION OF EPIDERMAL CELLS. INITIAL FUNDING IS SOUGHT FOR THE FURTHER DEVELOPMENT AND CHARACTERIZATION OF THIS PHYSIOLOGICAL SKIN MODEL AS A SUBSTRATE FOR CYTOTOXICITY STUDIES AND AS A MODEL

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FOR SKIN PENETRATION ASSAYS FOR TOXINS AND PHARMACEUTICALS.

MEASUREMENT CONCEPT CORP  
2697 INTERNATIONAL PKWY - PKWY 2/STE 201  
VIRGINIA BEACH, VA 23452  
CONTRACT NUMBER: DAABO7-89-C-A052  
JOHN RIVES  
TITLE:  
AUTOMATED TERRAIN INFERENCE FROM ELEVATION DATA  
TOPIC# 53            OFFICE: AMSEL/C3            IDENT#: 35104

THE MODERN BATTLEFIELD ENVIRONMENT DEMANDS TOOLS WHICH CAN ASSIST ARMY COMMANDERS IN MAKING TACTICAL DECISIONS ABOUT A DYNAMIC ENVIRONMENT IN A TIMELY MANNER. KNOWLEDGE OF THE TERRAIN, SUCH AS AREAS OF RELATIVE HIGH GROUND, IS A CRUCIAL FACTOR TO MANY OF THESE MODERN TACTICAL DECISION AIDS. IN ORDER TO AUTOMATE SUCH TACTICAL DECISION MAKING, THE COMPUTER MUST BE ABLE TO MAKE INFERENCES ABOUT THE TERRAIN FROM ELEVATION DATA WITHOUT HUMAN ASSISTANCE. COMPUTER ALGORITHMS EXIST THAT DETERMINE SEVERAL TERRAIN CHARACTERISTICS SUCH AS MASKED AREA AND LINE-OF-SIGHT. WHAT IS LACKING, HOWEVER, IS A GENERAL TOOL THAT WILL INFER TERRAIN CHARACTERISTICS FROM ELEVATION DATA AND PRODUCE A RASTER AND/OR VECTOR OUTPUT THAT IS AMENABLE TO FURTHER PROCESSING BY APPLICATIONS SUCH AS TACTICAL DECISION AIDS. MEASUREMENT CONCEPT CORPORATION (Mc2), THEREFORE, PROPOSES A TECHNOLOGICALLY INNOVATIVE APPROACH TO DEVELOP SUCH AN AUTOMATED TERRAIN INFERENCE TOOL. THE PROPOSED DEVELOPMENT METHODS WILL BE BASED ON CLASSICAL IMAGE PATTERN RECOGNITION AND/OR NEURAL NET TECHNIQUES USED IN COMBINATION WITH TERRAIN ANALYSIS METHODS.

MILLITECH CORP  
PO BOX 109 - S DEERFIELD RSCH PK  
SOUTH DEERFIELD, MA 01373  
CONTRACT NUMBER:  
H I EWEN  
TITLE:  
DUAL POLARIZATION 95 GHz PLANAR ANTENNA  
TOPIC# 27            OFFICE: HDL            IDENT#: 34874

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A COMPACT MILLIMETER WAVE APERTURE ANTENNA CAN BE DEVELOPED TO MEET HIGH PERFORMANCE EXPECTATIONS WHILE REDUCING THE LONG AXIAL LENGTH OF CURRENT HIGH PERFORMANCE ANTENNAS (REFLECTORS, LENSES, ETC). BY CLEVER USE OF THE OLDER CLASSICAL ANTENNA DESIGNS (ZONED OPTICAL TECHNIQUES) WITH MODERN PLANAR CIRCUITS (MICROSTRIP PATCH RADIATORS), THE BEST OF BOTH TECHNOLOGIES CAN BE UTILIZED IN A PRACTICAL DESIGN.

MISSION RESEARCH CORP  
PO DRAWER 719  
SANIA BARBARA, CA 93102  
CONTRACT NUMBER:  
C DAVID NEWLANDER  
TITLE:  
INNOVATIVE IN-BORE MOTION DETECTION TECHNIQUES  
TOPIC# 50      OFFICE: TECOM/YPG      IDENT#: 33413

MISSION RESEARCH CORPORATION PROPOSES A PHASE I SBIR EFFORT TO INITIATE THE DEVELOPMENT OF AN INNOVATIVE IN-BORE MOTION DETECTION SYSTEM FOR USE WITH TANK AND ARTILLERY BARRELS. THIS WILL BE ACCOMPLISHED BY REVIEWING THE CURRENT STATE OF THE ART IN DETECTION SYSTEMS, DETERMINING THE ARMY REQUIREMENTS FOR SUCH A SYSTEM, AND CONDUCTING THE NECESSARY ANALYSIS AND LABORATORY TESTING AND EXPERIMENTATION TO SELECT A SYSTEM FOR FINAL SCALE-UP AND DEVELOPMENT. WE WILL INITIALLY FOCUS ON THREE POTENTIAL TECHNIQUES: X-RAY TRANSMISSION, LASER INTERFEROMETRY, AND MAGNETIC. EACH OF THESE TECHNIQUES WILL BE INVESTIGATED AND ASSESSED IN TERMS OF THEIR APPLICABILITY FOR PROVIDING AN ACCURATE TRIGGER. PRELIMINARY CALCULATIONS INDICATE THAT AN X-RAY BEAM WITH AN ENERGY IN THE 250 TO 750 keV RANGE MAY BE ADEQUATE FOR BOTH COMPOSITE AND STEEL BARRELS. TESTS WILL BE PERFORMED USING IN-HOUSE PROJECTILE FIRING SYSTEMS AND SENSORS. THE PHASE I EFFORT WILL CULMINATE WITH THE PREPARATION OF A PROGRAM PLAN AND PROPOSAL FOR THE PHASE II PROGRAM. THE MAJOR FOLLOW-ON TASKS WILL INCLUDE DESIGN AND INTEGRATION OF THE ACTUAL SYSTEM SELECTED. FULL SCALE TESTS WILL BE PERFORMED AND A PROTOTYPE DESIGNED, FABRICATED, AND DELIVERED TO THE PROVING GROUND. SYSTEM SPECIFICATIONS WILL BE DEVELOPED.

MOLECULAR TOXICOLOGY INC  
335 PAINT BRANCH DR  
COLLEGE PARK, MD 20742  
CONTRACT NUMBER:  
DR JOHN O RUNDELL  
TITLE:  
IN VITRO RESPIRATORY TOXICITY SCREENING TESTS  
TOPIC# 78      OFFICE: AMRDC      IDENT#: 34632

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WE PROPOSE TO ESTABLISH PERMANENT, FUNCTIONALLY DIFFERENTIATED GUINEA PIG RESPIRATORY EPITHELIAL CELL LINES FOR USE IN THE DEVELOPMENT OF SHORT-TERM IN VITRO RESPIRATORY TOXICITY SCREENING TESTS. TO DO THIS, WE PROPOSE TO DETERMINE THE CULTURE CHARACTERISTICS OF GUINEA PIG RESPIRATORY EPITHELIAL CELLS AND TO EVALUATE THEM FOR THEIR EXPRESSION OF THREE CHARACTERISTIC DIFFERENTIATED PHENOTYPES: MUCIN PRODUCTION; CYTOCHROME P450 INDUCTION; AND FINE MORPHOLOGY. PRIMARY CELL POPULATIONS THUS CHARACTERIZED WILL BE EMPLOYED IN STUDIES AIMED AT EXTENDING THEIR STABILITY AND GROWTH PARAMETERS. TWO STRATEGIES WILL BE EXPLOITED: REVERSIBLE TRANSFORMATION WITH THE IMMORTALIZING AND TRANSFORMING LARGE T ANTIGEN ONCOGENE OF SV40, UNDER THE CONTROL OF THE REGULABLE MOUSE METALLOTHIONEIN PROMOTER AND/OR STABLE IMMORTALIZATION WITH THE "IMMORTALIZING" BUT NOT "TRANSFORMING" ELA ONCOGENE OF ADENOVIRUS, UNDER CONSTITUTIVE, NONREGULABLE CONTROL OF THE SV40 PROMOTER AND RETROVIRAL LONG TERMINAL REPEATS (LTS'S). TRANSFORMED, IMMORTALIZED RESPIRATORY CELL LINES THUS OBTAINED WILL BE EVALUATED FOR THEIR EXPRESSION OF THE RESPIRATORY EPITHELIAL DIFFERENTIATED PHENOTYPE BY USE OF COMPARATIVE ANALYSES VS. PRIMARY POPULATIONS.

MOLECULAR VACCINES INC  
19 FIRSTFIELD RD  
GAITHERSBURG, MD 20878  
CONTRACT NUMBER:  
MARC S COLLETT

TITLE:

SYNTHETIC VACCINES: TEST OF CONCEPTS AND APPLICATION TO RIFT  
VALLEY FEVER VIRUS  
TOPIC# 71      OFFICE: AMRDC      IDENT#: 34625

USE OF SYNTHETIC PEPTIDES, COMPRISING BOTH B AND T CELL DETERMINANTS, IS BEING CONSIDERED A VIABLE APPROACH TO VACCINE DEVELOPMENT. WE WILL EXPLORE THE SUITABILITY OF THIS STRATEGY EMPLOYING RIFT VALLEY FEVER VIRUS (RVFV) AS THE STUDY MODEL. THE IMMUNOGENICITY OF SYNTHETIC PEPTIDES REPRESENTING SEVERAL PREVIOUSLY IDENTIFIED B CELL ANTIGENIC DETERMINANTS ON THE G2 GLYCOPROTEIN OF RVFV WILL BE EVALUATED IN FOUR STRAINS OF MICE DIFFERING IN H-2 4APLOTYPE. A PEPTIDE SHOWING LOW IMMUNOGENICITY IN AT LEAST SOME MOUSE STRAINS

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WILL BE SELECTED FOR FURTHER STUDY. THE EFFECT OF KNOWN HELPER T CELL EPITOPES ON THE IMMUNOGENICITY OF THIS B EPITOPE PEPTIDE WILL THEN BE ESTABLISHED. FINALLY, HELPER T CELL SITE PREDICTIVE ALGORITHMS WILL BE TESTED FOR THEIR ABILITY TO IDENTIFY DETERMINANTS FROM THE GLYCOPROTEIN G2 SEQUENCE CAPABLE OF OVERCOMING THE NON-RESPONSIVENESS TO THE ABOVE B CELL EPITOPE. THESE STUDIES WILL EVALUATE SEVERAL CONCEPTS CENTRAL TO SYNTHETIC VACCINE DEVELOPMENT, AND IF VALIDATED, WILL ADVANCE THEIR APPLICATION TOWARD SUCH A VACCINE FOR RVFV.

MSNW INC  
PO BOX 865  
SAN MARCOS, CA 92069  
CONTRACT NUMBER:  
DR GEORGE H REYNOLDS  
TITLE:  
FUSION WELDING OF Al/SiC(p) COMPOSITES  
TOPIC# 29      OFFICE: MTL      IDENT#: 33408

THE PROPOSED RESEARCH WILL EXAMINE METHODS FOR GMAW WELDING OF Al/SiC(p) COMPOSITE BASE MATERIALS WITH SMALL DIAMETER EXTRUDED Al/SiC(p) COMPOSITE WELDING ELECTRODE WIRES. FEASIBILITY OF THE EXTRUSION PROCESS FOR PRODUCING THE REQUIRED SMALL DIAMETER WIRES AND BUTT WELDING OF EXTRUDED LENGTHS TO FORM CONTINUOUS WIRES HAVE PREVIOUSLY BEEN DEMONSTRATED. THE PROJECT WILL FOCUS ON PRODUCTION OF LARGER QUANTITIES OF EXTRUDED COMPOSITE ELECTRODE WIRES, EVALUATION OF SAME FOR SHORT CIRCUIT TRANSFER AND PULSED GMAW WELDING OF COMPOSITE BASE PLATES AND COMBINED NONDESTRUCTIVE AND DESTRUCTIVE EVALUATION OF THE PROTOTYPE WELDS. IN ADDITION COMPOSITE ELECTRODE WIRES WILL BE PROVIDED TO AMTL FOR INDEPENDENT EVALUATION AND WELDABILITY STUDIES. THE COMPOSITE ELECTRODES ARE EXPECTED TO FIND COMMERCIAL AND/OR MILITARY APPLICATIONS IN JOINING AND REPAIR OF METAL MATRIX COMPOSITE STRUCTURES.

NORTH AMERICAN SCIENCE ASSOCS INC  
2261 TRACY RD  
NORTHWOOD, OH 43619  
CONTRACT NUMBER:  
DR R DOUGLAS HUME  
TITLE:  
DEVELOPMENT OF A SHORT TERM IN-VITRO DERMAL TOXICITY SCREENING TEST USING HUMAN CELLS  
TOPIC# 77      OFFICE: AMRDC      IDENT#: 34631

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THERE IS A LARGE EFFORT UNDERWAY IN THE WORLD TODAY TO IDENTIFY AND DEVELOP IN-VITRO ALTERNATIVE TESTS TO SUPPLEMENT OR REPLACE CURRENT IN-VIVO TOXICITY TEST METHODS. THE AGAROSE DIFFUSION METHOD IS AN EXCELLENT CANDIDATE FOR DEVELOPMENT AS A SHORT TERM IN-VITRO DERMAL TOXICITY SCREENING TEST USING HUMAN CELLS. THE PHASE I EFFORT WILL ATTEMPT TO ADAPT THE CURRENT AGAROSE DIFFUSION METHOD FOR USE IN SCREENING FOR PRIMARY SKIN IRRITATION. THIS MAY REQUIRE MANIPULATION OF THE AGAROSE THICKNESS, VARYING THE SERUM CONTENT IN THE CULTURE MEDIUM, AND USING ALTERNATIVE CELL TYPES. APPROPRIATE HUMAN CELL LINES WILL BE ADAPTED TO THE TEST METHOD. OF PRIMARY INTEREST IS THE USE OF A PRIMARY HUMAN FORESKIN CELL LINE. OTHER CELL LINES MAY BE CONSIDERED. OF PARTICULAR INTEREST IS A COMPARISON OF HUMAN CELL LINES WITH THE L-929 MOUSE FIBROBLAST CELL LINE THAT HAS BEEN USED IN THIS TEST METHOD BY THE MEDICAL DEVICE INDUSTRY FOR OVER 20 YEARS. FOLLOWING ADAPTATION OF THE TEST METHOD, PRELIMINARY SCREENING OF KNOWN SAMPLES AND COMPARISON WITH RABBIT DERMAL TOXICITY DATA WILL BE CONDUCTED. NAMSA HAS AVAILABLE A CONSIDERABLE COLLECTION OF DATA GENERATED ON VARIOUS TEST MATERIALS. THIS WILL ALLOW A RAPID EVALUATION OF THE CORRELATION BETWEEN THE AGAROSE DIFFUSION METHOD AND RABBIT DERMAL TOXICITY TESTING.

NORTHEAST RESEARCH INSTITUTE INC  
309 FARMINGTON AVE -STE A100  
FARMINGTON, CT 06032  
CONTRACT NUMBER:  
IRVING N EINHORN  
TITLE:

UTILIZATION OF NEUROPHYSIOLOGICAL PROTOCOLS TO CHARACTERIZE SOLDI  
RESPONSE TO IRRITANT GASES  
TOPIC# 79      OFFICE: AMRDC      IDENT#: 34864

THERE IS NO WIDELY ACCEPTED PROTOCOL FOR THE ASSESSMENT OF THE TOXIC EFFECTS OF IRRITANT GASES ON HUMANS. MOST PROCEDURES EMPLOYED FOR THIS PURPOSE UTILIZE ENDPOINTS THAT ASSESS TIME-TO-INCAPACITATION AND LETHALITY. WE WILL WITHIN THE SCOPE OF THIS PROPOSAL UTILIZE A NEUROPHYSIOLOGICAL MONITORING PROTOCOL TOGETHER WITH A BIOASSAY AND BEHAVIORAL PROCEDURE WITH WHICH WE HAVE PREVIOUSLY DEMONSTRATED ABILITY TO MONITOR THE DECREMENT OF PERFORMANCE IN LONG EVANS RATS

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EXPOSED TO CARBON MONOXIDE AND HYDROGEN CHLORIDE, INDIVIDUALLY AND IN MIXED CONCENTRATIONS. WE WILL IN THE PROPOSED PHASE I PROGRAM MODIFY OUR ANIMAL EXPOSURE CHAMBER, WHICH WILL BE UTILIZED WITH A VARIETY OF COMPUTERIZED ANALYTICAL SYSTEMS TO MONITOR THE CHAMBER'S ATMOSPHERE AND DEVELOP CRITERIA BASED ON ELECTROPHYSIOLOGICAL TECHNIQUES FOR THE ASSESSMENT OF THE FIRST OBSERVABLE DECREMENT OF PERFORMANCE UPON EXPOSURE TO HYDROGEN CHLORIDE. THE RESULTS OBTAINED WILL BE UTILIZED WITHIN THE PHASE II PROGRAM TO DEVELOP A RAPID INEXPENSIVE PROTOCOL FOR THE FIRST-TIER ASSESSMENT OF THE DECREMENT OF PERFORMANCE TO HUMAN EXPOSED TO WEAPONS SYSTEMS EMISSIONS. WE PLAN TO EMPLOY MINIATURE PIGS AND SMALL PRIMATE DURING THE PHASE II PROGRAM TO PERMIT AN EXTRAPOLATION OF LABORATORY RESULTS TO HUMAN RESPONSE.

ORLANDO TECHNOLOGY INC  
PO BOX 855

SHALIMAR, FL 32579

CONTRACT NUMBER:

ARTHUR G BUILTA

TITLE:

ROCKET DELIVERED DISPERSED PENETRATOR TRAJECTORIES AND TERMINAL EFFECTS ASSESSMENT MODEL

TOPIC# 14      OFFICE: AVSCOM      IDENT#: 33898

PHASE I WILL PRODUCE AN INITIAL ROCKET PROPELLED, PENETRATOR DAMAGE EFFECTS MODEL. IT WILL BE COMPOSED OF COMPUTER PROGRAM ELEMENTS EXTRACTED FROM SIMILAR SUBMUNITION PROGRAMS FOR WHICH OTI HAS CURRENT TECHNICAL AND MAINTENANCE RESPONSIBILITY. A THREE-DIMENSIONAL, FOURTH ORDER RUNGE-KUTTA INTEGRATION TECHNIQUE WILL BE USED TO COMPUTE THE PATHS OF THE LAUNCH AIRCRAFT, THE ROCKET, THE PENETRATORS, AND THE MANEUVERING TARGET. THE ATTACKER, ROCKET AND TARGET CAN MANEUVER DURING THE ENCOUNTER. LAUNCH DISTURBANCES ON THE ROCKET ARE MODELED. AT DISPERSION, THE PENETRATORS FORMING THE BOUNDARIES OF THE PENETRATOR "CLOUD" ARE TRACKED. THE 3-DIMENSIONAL CLOUD ENCOUNTERS THE TARGET AND THE PART OF THE CLOUD SWEEPED BY THE CRITICAL TARGET COMPONENTS IS EVALUATED TO DETERMINE HIT PROBABILITY AND SPEED AT THE TARGET. THE DAMAGE FUNCTION IS COMPUTED FROM EACH TARGET COMPONENT VULNERABILITY BASED ON IMPACT VELOCITY, TARGET MOTION, IMPACT DIRECTIONS, PENETRATOR MASS, AND THE NUMBER OF HITS. ONE OF

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FOUR AVAILABLE DISPERSION MECHANISM MODELS (DRAG ON THE ROCKET, SPIN, FORCED OR EXPLOSIVE EJECTION) WILL BE USED (WEAPON DEPENDENT). ONE OF TWO DAMAGE ASSESSMENT MODELS WILL BE USED (SAFE ESCAPE, OR AN ADAPTATION OF THE VULNERABLE TECHNIQUES USING JMEN METHODOLOGY).

PAR ASSOCS  
1741 POMONA DR  
LAS CRUCES, NM 88001  
CONTRACT NUMBER:  
JAMES D KLETT  
TITLE:  
LASER INDUCED FLUORESCENCE SIGNAL DETECTION ANALYSIS ALGORITHMS  
TOPIC# 24      OFFICE: ASL      IDENT#: 34873

THEORETICAL STUDY OF UV LIDAR INDUCED FLUORESCENCE OF DILUTED MIXTURES OF UNKNOWN EMITTERS, THE OBJECTIVE BEING TO DESCRIBE THE CONDITIONS FOR WHICH IT IS POSSIBLE TO DETECT AND/OR QUANTITATIVELY DETERMINE THE IDENTITY OF FLUORESCENCE COMPONENTS. TECHNIQUES APPLIED TO THIS PROBLEM INCLUDE EIGENANALYSIS, FOURIER TRANSFORMATIONS, AND PATTERN RECOGNITION THEORY. EMPHASIS ON SELECTING OPTIMAL FEATURES FROM SPECTRAL AND TIME DECAY DATA TO OBTAIN CLASSIFICATION RULES FOR SPECIES IDENTIFICATION.

PDA ENGINEERING  
2975 REDHILL AVE  
COSTA MESA, CA 92626  
CONTRACT NUMBER:  
DR RONALD E ALLRED  
TITLE:  
RADICAL APPROACH TO INDUCTION COIL DESIGN FOR AIRCRAFT REPAIR  
TOPIC# 7      OFFICE: AVSCOM      IDENT#: 33892

AIRCRAFT REPAIR IN A FIELD ENVIRONMENT DEMANDS A FAST ACTING EFFECTIVE PROCESS THAT IS EXTREMELY VERSATILE. INDUCTION HEATING IS WELL SUITED FOR FIELD LEVEL REPAIR IN THAT IT IS A VERY FAST HEATING TECHNIQUE AND IT CAN BE MADE TO OPERATE ON AVAILABLE POWER SOURCES. THE PROBLEM WITH CURRENT INDUCTION HEATING DEVICES IS

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THEY ARE NOT SUITED FOR USE ON CURVED OR LARGE AREA PATCHES. A RADICAL NEW APPROACH TO INDUCTION COIL DESIGN IS PROPOSED WHICH INVOLVES A FLEXIBLE COIL THAT CAN BE CONTOURED TO FIT CURVED PATCHES OF ANY GEOMETRY. THE NEW COIL TRANSFORMS INDUCTION HEATING INTO A STAND-ALONE REPAIR TECHNOLOGY THAT CAN BE USED THROUGHOUT THE AIRCRAFT. USE OF THE NEW COIL SHOULD SPEED REPAIRS SIGNIFICANTLY WHILE REDUCING WEIGHT AND THE NEED FOR OTHER EQUIPMENT.

PDA ENGINEERING  
2975 REDHILL AVE  
COSTA MESA, CA 92626

CONTRACT NUMBER:  
RICHARD L HACK

TITLE:

ASSESSMENT OF CT AS AN NDE METHODOLOGY FOR REINFORCED PHENOLIC NOZZLES

TOPIC# 42      OFFICE: MICOM      IDENT#: 34614

CURRENT NDE METHODS ARE LARGELY DEPENDENT UPON QUALITATIVE INDICATORS. TOMOGRAPHIC NDE METHODS OFFER THE POTENTIAL OF DEVELOPING QUANTITATIVE ACCEPT/REJECT CRITERIA. COMPUTED X-RAY TOMOGRAPHY (CT) CAN DEFINE MATERIAL CHARACTERISTICS, SUCH AS DENSITY, ON A SPATIALLY-RESOLVED BASIS. THE DEVELOPMENT OF SENSITIVE MATERIAL PROPERTY-DENSITY RELATIONSHIPS COMBINED WITH SOLID MODELING AND FINITE ELEMENT ANALYSIS METHODS ALLOW THE CT DENSITY MEASUREMENT CAPABILITY TO BE EMPLOYED IN A QUANTITATIVE, PREDICTIVE MANNER. CT MEASUREMENTS ON CARBON-PHENOLIC WILL BE CORRELATED WITH PHYSICAL DENSITY MEASUREMENTS TO ESTABLISH CT DENSITY CALIBRATION STANDARDS. MATERIAL PROPERTY-DENSITY MODELS WILL BE DEVELOPED BASED ON AVAILABLE DATA AND A LIMITED TEST PROGRAM. A TWO-DIMENSIONAL CARBON-PHENOLIC COMPONENT WILL BE SUBJECTED TO CT INSPECTION AND SUBJECTED TO A FINITE ELEMENT STRUCTURAL ANALYSIS BASED ON CT-DEDUCED MATERIAL PROPERTIES. MECHANICAL TESTING WILL PROVIDE EVALUATION OF PREDICTIVE CAPABILITIES. THE CAPABILITIES OF DUAL ENERGY CT AND NMR TO DETECT FOREIGN MATERIAL CONTAMINATION (I.E., WATER) WILL BE ADDRESSED.

PHYSICAL OPTICS CORP  
2545 W 237TH ST - STE B  
TORRANCE, CA 90505

CONTRACT NUMBER:

DR GAJENDRA SAVANT

TITLE:

PASSIVE AGILE LASER FILTERS

TOPIC# 46      OFFICE: TACOM      IDENT#: 33907

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PHYSICAL OPTICS CORPORATION PROPOSES TO DEVELOP BROADBAND LASER FILTERS WHICH OPERATE IN THE VISIBLE REGION OF THE SPECTRUM (400 - 700 nm), DO NOT REQUIRE ANY EXTERNAL BIASING (THERMAL OR ELECTRICAL) OR A FOCAL PLANE, AND WHICH CAN BE USED OVER RELATIVELY LARGE AREAS (100 cm<sup>2</sup>). THE FUNDAMENTAL APPROACH USES A BACK PROPAGATING SELF-INDUCED BRAGG STRUCTURE THAT IS HIGHLY REFLECTIVE TO ANY LASER FREQUENCY IN THE VISIBLE AND NEAR IR REGION OF THE SPECTRUM. THESE FILTERS WILL REPRESENT A NEW GENERATION OF HOLOGRAPHIC BRAGG REFLECTION FILTERS WHICH CREATE THEMSELVES AT THE THREAT WAVELENGTH BUT REMAIN TRANSPARENT TO OTHER PORTIONS OF THE SPECTRUM AND SUBSEQUENTLY ERASE THEMSELVES WHEN THE THREAT GOES AWAY. THUS, IN ADDITION TO HAVING ALL OF THE ADVANTAGES OF CONVENTIONAL HOLOGRAPHIC FILTERS, THIS AGILE FILTER WILL ALSO POSSESS THE UNIQUE FEATURE OF REFLECTING LASER BEAMS WHILE BEING HIGHLY TRANSMISSIVE TO AMBIENT ILLUMINATION. THESE NEW FILTERS CAN BE EXPECTED TO HAVE A HIGH PHOTOPIC TRANSMISSION (70% OR GREATER) WHILE PROVIDING PROTECTION AGAINST BOTH PULSED AND CONTINUOUS WAVE LASERS AS THE FILTER WILL HAVE RESPONSE TIMES ON THE ORDER OF PICOSECONDS.

PRAXIS INTERNATIONAL INC  
319 N POTTSTOWN PIKE - STE 103  
EXTON, PA 19341

CONTRACT NUMBER:

DR CLAYBORNE D TAYLOR

TITLE:

DATA ENHANCEMENT TECHNIQUES FOR MEASUREMENTS USING BANDWIDTH-LIMITED INSTRUMENTATION

TOPIC# 36

OFFICE: MICOM

IDENT#: 34608

GENERALLY, THE MEASUREMENT OF A FAST NON-REPETITIVE TRANSIENT THAT OCCURS WHEN AN ELECTRICAL SYSTEM IS EXPOSED TO AN ELECTROMAGNETIC PULSE (SUCH AS MIL-STD-2169) IS SEVERELY LIMITED BY THE BANDWIDTH AND THE DYNAMIC RANGE OF THE INSTRUMENTATION. MOREOVER, NOISE FROM VARIOUS SOURCES CAN CORRUPT THE MEASURED DATA TO THE POINT THAT IT IS VERY DIFFICULT TO INTERPRET THE RESULTS. A SPECTACULAR GROWTH IN SIGNAL ANALYSIS TECHNIQUES HAS OCCURRED IN RECENT YEARS. MANY OF THESE TECHNIQUES CAN BE USED TO ENHANCE THE QUALITY OF DISCRETE-TIME DATA. IT IS THE PURPOSE OF THIS RESEARCH PROJECT TO IDENTIFY THOSE

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TECHNIQUES THAT CAN BE APPLIED TO THE MEASUREMENT OF ELECTRICAL TRANSIENTS AND TO DEVELOP NEW TECHNIQUES FOR THE IMPROVEMENT OF DATA QUALITY. THIS ENHANCEMENT NOT ONLY INCLUDES THE REDUCTION OF THE NOISE CONTENT, BUT IT ALSO INCLUDES THE REDUCTION OF DISTORTION RESULTING FROM BANDWIDTH LIMITATIONS OF THE INSTRUMENTATION AS WELL AS DISTORTION FROM NONLINEAR RESPONSES. SOFTWARE WILL BE DEVELOPED THAT CAN BE IMPLEMENTED ON AN ADVANCED MICROCOMPUTER. CONSEQUENTLY, IN ADDITION TO BEING EFFECTIVE, THE ANALYSIS ALGORITHMS WILL ALSO HAVE TO BE FAST IN TERMS OF EXECUTION TIME.

RAYEX CORP  
15215 SHADY GROVE RD  
ROCKVILLE, MD 20850

CONTRACT NUMBER:

DR J W MOTZ

TITLE:

SEALED ROTATING ANODE X-RAY TUBE WITH ENHANCED POWER AND DUTY CYC  
TOPIC# 84 OFFICE: AMRDC IDENT#: 34872

RAYEX PROPOSES TO DEVELOP A ROTATING ANODE X-RAY TUBE WHICH WILL HAVE UNIQUE DESIGN FEATURES SUCH THAT ITS POWER AND DUTY CYCLE CAPABILITIES WILL BE INCREASED BY AT LEAST A FACTOR OF TWO OVER PRESENT-DAY TUBES INCLUDING MICRO-FOCUS TUBES. THE TUBE WILL BE SEALED AND SELF-CONTAINED WITH NO EXTERNAL PUMPING, AND WILL HAVE A PRACTICAL SIZE SUCH THAT IT CAN BE RETROFITTED TO PRESENT-DAY X-RAY SCANNING AND COMPUTER TOMOGRAPHY DEVICES. WITH THE ADDITION OF OTHER DESIGN FEATURES IN A PHASE II PROGRAM, THE POTENTIAL POWER ENHANCEMENT OF THE TUBE IS EXPECTED TO BE A FACTOR OF TEN.

SAT-CON TECHNOLOGY CORP  
71 ROGERS ST  
CAMBRIDGE, MA 02142

CONTRACT NUMBER:

JAMES R DOWNER

TITLE:

DIRECT ELECTRIC TAIL ROTOR INTEGRATED DRIVE (DETRID) SYSTEMS FOR HELICOPTERS  
TOPIC# 20 OFFICE: AVSCOM IDENT#: 33904

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SAT-CON TECHNOLOGY CORPORATION PROPOSES TO ASSIST THE U.S. ARMY IN THE DEVELOPMENT OF A DIRECT ELECTRIC TAIL ROTOR INTEGRATED DRIVE (DETRID) SYSTEM FOR HELICOPTERS. THIS IS AN INNOVATIVE APPROACH FOR HELICOPTERS IN WHICH THE TAIL ROTOR BLADE ACTS AS THE ROTOR OF AN ELECTRIC MOTOR, PROVIDING THE NECESSARY ANTITORQUE REQUIREMENT. PHASE I WORK PERFORMED WILL INVOLVE A STUDY OF THE POWER DENSITY AND RESPONSIVENESS OF AT LEAST THREE DETRID SYSTEM CONFIGURATIONS TO DETERMINE THEIR RELATIVE FEASIBILITY, MERITS, AND PENALTIES IN ORDER TO OPTIMIZE PERFORMANCE. THE STRAWMAN CONFIGURATIONS WILL INCLUDE THAT SUGGESTED BY THE ARMY IN ITS SOLICITATION AS WELL AS SEVERAL OTHERS WHICH SAT-CON BELIEVES TO HAVE MERIT. CONTROLS AND SWITCHING LOGIC/CONTROL ELECTRONICS, WILL ALSO BE INVESTIGATED. PHASE II WOULD INVOLVE DETAILED DESIGN, FABRICATION, AND BENCH-TYPE TESTING FOR THE DETRID CONFIGURATION.

SCIENTIFIC COMPUTING & CONTROL INC

PO BOX 5440

HUNTSVILLE, AL 35814

CONTRACT NUMBER:

WILLY ALBANES

TITLE:

DESIGN OF FIFTH-SCALE REMOTE CONTROL HELICOPTER FOR ROTOR RESEARC

TOPIC# 8                      OFFICE: AVSCOM                      IDENT#: 33893

WE PROPOSE TO PRODUCE A PRELIMINARY DESIGN OF A FIFTH-SCALE REMOTE CONTROL HELICOPTER REPRESENTING A BLACK HAWK OR APACHE. THE DESIGN WILL BE PRODUCED SUCH THAT ROTORS CAN BE EASILY CHANGED FOR ROTOR EMPIRICAL RESEARCH OR TESTING. WE WILL USE AS MUCH AS POSSIBLE AVAILABLE HARDWARE AND TECHNIQUES, AND DRAW FROM OUR OWN EXTENSIVE EXPERIENCE WITH US ARMY MICOM FIFTH-SCALE REMOTELY PILOTED HELICOPTER DESIGN, AND FROM OUR EXTENSIVE EXPERIENCE WITH WIND TUNNEL ANALYSIS AND OPERATIONAL TESTING. THE PRODUCED DESIGN DOCUMENTATION WILL BE EXTENSIVE, ENOUGH TO PERMIT EASY ENTRY INTO PHASE II'S MANUFACTURING PHASE. THE DESIGN WILL BE BASED ALSO ON MODEL ROTOR WIND TUNNEL EVALUATIONS PUBLISHED BY NASA AND ARMY.

SCIENTIFIC RESEARCH ASSOCS INC

PO BOX 1058 - 50 NYE RD

GLASTONBURY, CT 06033

CONTRACT NUMBER:

HAROLD L GRUBIN

TITLE:

NUMERICAL MODELING OF HIGH-SPEED ELECTRONIC DEVICES USING HIGH-Tc SUPERCONDUCTORS

TOPIC# 26                      OFFICE: ETDL                      IDENT#: 33405

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THIS DOCUMENT DISCUSSES A PROPOSAL TO PERFORM NUMERICAL SIMULATIONS OF ELECTRONIC DEVICES MAKING USE OF THE RECENTLY DISCOVERED HIGH-T(c) SUPERCONDUCTING OXIDES. NUMERICAL SIMULATIONS ARE TO BE PERFORMED THROUGH IMPLEMENTATION OF SCIENTIFIC RESEARCH ASSOCIATES INC.'S (SRA) ALGORITHMS: STARTING WITH FROM THE GINZBURG-LANDAU EQUATIONS, THE EQUATIONS GOVERNING THE DYNAMICS OF THE SUPERCONDUCTORS ARE WRITTEN IN A FORM VERY SIMILAR TO THE EQUATIONS OF HYDRODYNAMICS. WE PROPOSE A TECHNIQUE TO COUPLE THE SUPERCONDUCTING FLUID EQUATIONS, THE DEVICE (SEMICONDUCTING) EQUATIONS AND MAXWELL'S EQUATIONS. THE TECHNIQUE IS THEN APPLIED TO STUDY THE PROPAGATION CHARACTERISTICS OF SUPERCONDUCTING MICROSTRIP LINES AND WIRES.

SCIENTIFIC TECHNOLOGY INC

2 RESEARCH PL

ROCKVILLE, MD 20850

CONTRACT NUMBER:

TING-I WANG

TITLE:

A PASSIVE OPTICAL SCINTILLOMETER USING A NATURALLY ILLUMINATED SCENE

TOPIC# 52

OFFICE: TECOM/DPG

IDENT#: 33415

ATMOSPHERIC TURBULENCE MEASUREMENT IS IMPORTANT TO ARMY ARTILLERY, AVIATION OPERATIONS AND PREDICTION OF LASER AND CHEMICAL WEAPONS EFFECTS. ATMOSPHERIC TURBULENCE-INDUCED OPTICAL SCINTILLATIONS HAVE LONG BEEN REALIZED THAT OBSERVATIONS OF THE TWINKLING OF STARS AND THE MOTION OF STELLITE IMAGES YIELD INFORMATION ABOUT THE TURBULENCE AND THE WIND SPEED IN THE UPPER ATMOSPHERE. THIS PROPOSAL ADDRESSES A DIAGNOSTIC TECHNIQUE WHICH WILL MEASURE ATMOSPHERIC TURBULENCE INTENSITY USING A NATURALLY ILLUMINATED SCENE SUCH AS A SUNLIT HILLSIDE, A FOREST OR BUILDINGS. THE PROPOSED TECHNIQUE IS BASED ON A MODIFICATION OF THE EXISTING OPTICAL SCINTILLOMETER FOR WIND MEASUREMENT DEVELOPMENT BY WAVE PROPAGATION LABORATORY OF NOAA. THE OLD SCINTILLOMETER WAS DESIGNED TO MEASURE THE CROSSWIND ONLY. HOWEVER, WITH THE HELP OF MORE SOPHISTICATED ALGORITHM, A SECOND GENERATION OPTICAL SCINTILLOMETER IS ABLE TO MEASURE BOTH ATMOSPHERIC TURBULENCE INTENSITY AND WIND USING A NATURALLY ILLUMINATED SCENE. THE INSTRUMENT WILL PROVIDE REAL-TIME CONTINUOUS MEASUREMENTS OF

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TURBULENCE INTENSITY IN THE FIELD OPERATION; ALTHOUGH FOGS AND SMOKES MAY OCCASIONALLY INTERRUPT THE MEASUREMENTS, THE INSTRUMENT IS INSENSITIVE TO ENVIRONMENTAL ACOUSTIC AND ELECTROMAGNETIC NOISES. IT IS COMPACT FOR EASY TRANSPORTING AND OPERATIONS.

SEMTAS CORP  
7217 MASONVILLE DR  
ANNANDALE, VA 22003  
CONTRACT NUMBER:  
DR WILLIAM G DUFF

TITLE:  
UPDATING CURRENT ELECTRO-MAGNETIC INTERFERENCE/ELECTROMAGNETIC COMPATIBILITY (EMI/EMC) TEST METHODS AND EQUIPMENT  
TOPIC# 11 OFFICE: AVSCOM IDENT#: 33896

MIL-E-6051, MIL-STD-461 AND MIL-STD-462 ARE ADDRESSED FOR UPDATING CURRENT EMI/EMC TEST METHODS AND EQUIPMENT. THE PROBLEMS WITH THE USE OF EACH OF THE SPECIFICATIONS FOR THE CURRENT STATE-OF-THE-TECHNOLOGY ARE IDENTIFIED AND SOLUTIONS TO THE PROBLEMS ARE PROPOSED. MIL-E-6051 SOLUTIONS ARE TO DEVELOP METHODOLOGIES AND ANALYSES THAT REDUCE SYSTEM LEVEL TESTS AND DEVELOP METHODOLOGIES THAT DEFINE THE EM ENVIRONMENT AND ASSESS SYSTEM SUSCEPTIBILITY TO THE ENVIRONMENT WHILE DECREASING EVALUATION TIME AND IMPROVING CONFIDENCE IN THE RESULTS. MIL-STD-461 SOLUTION IS TO DEFINE MODIFICATIONS AND INSTRUMENTATION THAT WILL MAKE THE STANDARD APPLICABLE TO CURRENT AND NEAR-FUTURE OPERATIONAL EQUIPMENT AND SYSTEMS. MIL-STD-462 SOLUTIONS ARE TO DEFINE INSTRUMENTATION FOR PERFORMING EMISSION MEASUREMENTS ON A "BAND" BASIS THEREBY REDUCING TEST TIME AND IMPROVING TEST ACCURACY. ALSO, TO DEVELOP METHODOLOGY AND DEFINE INSTRUMENTATION FOR REDUCING OR ELIMINATING THE NEED FOR HIGH LEVEL RADIATED SUSCEPTIBILITY TESTS WHICH REDUCES COSTS FOR SUSCEPTIBILITY EVALUATIONS AND RAISES CONFIDENCE IN TEST RESULTS. PHASE II FOLLOW-ON WOULD RESULT IN UPDATING EMI/EMC STANDARDS TO INCLUDE NEW METHODOLOGIES, PARAMETERS AND LIMITS. ALSO, PHASE II WOULD DEFINE THE NEW OR IMPROVED INSTRUMENTATION REQUIRED TO PERFORM EVALUATIONS IN ACCORDANCE WITH THE UPDATED SPECIFICATIONS.

SEPARATION INDUSTRIES  
PO BOX 4338 - 4 LEONARD ST  
METUCHEN, NJ 08840  
CONTRACT NUMBER:  
DR ASIT ROY

TITLE:  
NOVEL ACTIVE SORBENTS FOR DECONTAMINATION OF CHEMICAL WARFARE AGE  
TOPIC# 2 OFFICE: CRDEC IDENT#: 33402

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PRESENTLY DIATOMACIOUS EARTH/FULLER'S EARTH ARE COMMONLY USED FOR DECONTAMINATION OF C.W.A., BUT THE CAPACITY OF THESE SORBENTS ARE ONLY LIMITED TO 25% OF THE SOLID'S WEIGHT. THIS EFFORT IS TO DEVELOP A REACTIVE SORBENT WHICH WILL CHEMICALLY (OR CATALYTICALLY) DESTROY THE C.W.A. WE HAVE CHOSEN HIGH SURFACE AREA INEXPENSIVE POROUS SILICA AS THE STARTING SORBENT. POROUS SILICA WILL BE SILANIZED BY VARIETIES OF SILANES TO PRODUCE HYDROLYTICALLY STABLE Si-O-Si LINKAGES. THE SILANES HAVE BEEN SO CHOSEN THAT THERE WILL BE TERMINAL ACTIVE FUNCTIONS FOR FURTHER DERIVITIZATIONS WITH DESIRED LIGANDS. THE SYNTHESIZED ACTIVATED SORBENT WILL CARRY IN ALL CASES TERMINAL MOIETIES WHICH WILL DESTROY THE C.W.A. THE FOLLOWING TYPES OF FUNCTIONALITIES WILL BE AVAILABLE IN THE MODIFIED SILICEOUS SORBENTS: (I) WEAK AND STRONG CATIONIC GROUPS (II) AROMATICS CONTAINING TERTIARY AMINES (III) STRONG ANIONIC GROUPS (IV) CHELATORS (V) NUCLEOPHILES LIKE PYRIDINE, IMIDAZOLE, PYRROLE, PYRROLIDINE AND MORPHOLINE (VI) CHLOROSULFONAMIDES (VII) 4-N, N (DIMETHYLAMINO) PYRIDINE (VIII) LEAVING GROUPS LIKE CARBONYL IMIDAZOLE AND 2-HYDROXYPYRIDINE (IX) THIOL GROUPS AND (X) ACTIVE CHLORINE. AFTER SYNTHESIS, EACH OF THE ACTIVATED SORBENTS WILL BE ANALYZED FOR INCORPORATION (QUALITATIVELY AND QUANTITATIVELY).

SIGMATECH INC  
555 SPARKMAN DR - STE 1610  
HUNTSVILLE, AL 35816  
CONTRACT NUMBER:  
DR GURMEJ S SANDHU  
TITLE:  
SOLID-STATE ELECTRONIC GIMBALLING OF MISSILE SEEKERS  
TOPIC# 37      OFFICE: MICOM      IDENT#: 34924

A UNIQUE METHODOLOGY FOR SOLID-STATE ELECTRONIC GIMBALLING OF MISSILE SEEKERS IS DESCRIBED. THE APPROACH UTILIZES THE ABILITY OF SOLID-STATE IMAGING SENSOR TO DYNAMICALLY POSITION THE AREA OF INTEREST IN THE SCENE FOR ELECTRONIC STABILIZATION. THE PROPOSED CONCEPT IS BASED UPON THE ADAPTATION OF THE CCD CLOCK SIGNALS TO OUTPUT THE DESIRED IMAGE. PROPER SHIFTING OF THE CCD VERTICAL AND HORIZONTAL REGISTERS PRIOR TO IMAGE OUTPUT THROWS AWAY THE UNWANTED PORTION OF SCENE FOR REAL-TIME OPERATION. THE IMAGE IS THEN SAMPLED

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AT A SLOWER THAN NORMAL RATE TO MAINTAIN SAME OUTPUT FORMAT. THE PRELIMINARY DESIGN IS BASED ON A CCD CAMERA WITH 488 BY 380 RESOLUTION. HOWEVER, THE PROPOSED METHODOLOGY IS APPLICABLE TO BOTH LOW AND HIGH RESOLUTION IMAGING DEVICES AND CAN ALSO BE EXPANDED TO ELECTRONIC ROLLING OF THE IMAGE PLANE.

SIGNAL ANALYTICS

374 MAPLE AVE E - STE 200

VIENNA, VA 22180

CONTRACT NUMBER:

DR MICHAEL S MORT

TITLE:

A METHOD OF ANALYZING ATR SYSTEM PERFORMANCE BASED ON SHAPE DISTORTION

TOPIC# 23

OFFICE: ARO

IDENT#: 33927

ALTHOUGH THE AFFECTS OF SENSOR PARAMETERS ON HUMAN RECOGNITION PERFORMANCE HAVE BEEN STUDIED EXTENSIVELY, WORK DONE TO RELATE SENSOR PARAMETERS TO AUTOMATIC TARGET RECOGNITION (ATR) SYSTEM PERFORMANCE IS STILL IN ITS INFANCY. THIS PROPOSAL OUTLINES A PROGRAM WITH THE FOLLOWING OBJECTIVES: (i) DEVELOP A COMPUTATIONAL METHOD FOR MODELING ATR SYSTEM PERFORMANCE WHICH ENJOYS THE SAME CHARACTERISTICS THE MRT MEASURE DOES FOR MAN IN THE LOOP PERFORMANCE MODELING. THIS METHOD WILL BE BASED ON MEASURING HOW EACH COMPONENT OF AN IMAGE PROCESSING SYSTEM DISTORTS THE SHAPE OF A TARGET OR CLUTTER OBJECT. (ii) FIND THE FUNCTIONAL RELATIONSHIP BETWEEN VARIOUS CANDIDATE MEASURES OF SHAPE DISTORTION AND THE PROBABILITY OF RECOGNIZING A TARGET. (iii) FIND A PARAMETRIC SET OF TEST PATTERNS WHICH IS HOMOMORPHIC TO REAL TARGETS AND CLUTTER WITH RESPECT TO THE CHOSEN SHAPE DISTORTION MEASURE SO THAT TARGET AND CLUTTER INDEPENDENT PERFORMANCE RESULTS MAY BE ACHIEVED BY ANALYZING ONLY A SMALL SET OF DATA.

SIGNAL ANALYTICS

374 MAPLE AVE E - STE 200

VIENNA, VA 22180

CONTRACT NUMBER: DAAB07-39-C-P021

DR ROBERT J FONTANA

TITLE:

A NEURAL NETWORK APPROACH TO ESM DATA CLUSTERING AND EMITTER IDENTIFICATION

TOPIC# 55

OFFICE: CECOM-E/W

IDENT#: 34622

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THE PROCESSING THROUGHPUT OF AN ESM SYSTEM IS DIRECTLY RELATED TO ITS ABILITY TO GROUP INCOMING PULSES INTO CLUSTERS, EACH OF WHICH CONTAIN A UNIQUE EMITTER. THE APPROACH TO THIS PROBLEM PRESENTED HERE PROVIDES A STRATEGY FOR PERFORMING UNIQUE SIGNAL CLUSTERING AND CLASSIFICATION BASED UPON THE USE OF NEURAL NETWORKS. PRE-SORT CLUSTERING WILL BE ACHIEVED THROUGH A SELF ORGANIZING CLUSTERED (SOC) NETWORK WHICH ADAPTIVELY DERIVES CLUSTER GEOMETRIES. THE SOC UTILIZES A MINIMUM DISTANCE CRITERION AND IT IS TOTALLY DATA ADAPTIVE IN THAT NO A PRIORI LIBRARY INFORMATION IS NEEDED TO SET UP AN INITIAL CLUSTER CONFIGURATION. CLASSIFICATION WILL BE ACCOMPLISHED THROUGH THE USE OF AN ADAPTIVE NETWORK SENSOR PROCESSOR (ANSP) WHICH CAN UTILIZE INCOMPLETE OR NOISY PULSE DESCRIPTOR WORDS, SUCH AS MIGHT OCCUR IN WARM SITUATIONS. THE TWO NETWORKS ARE CONFIGURED TO MINIMIZE THE AMOUNT OF PULSE DEINTERLEAVING REQUIRED TO OBSERVE AND IDENTIFY EACH EMITTER.

SIMULA INC  
10016 S 51ST ST  
PHOENIX, AZ 85044  
CONTRACT NUMBER:  
JOSEPH W COLTMAN  
TITLE:  
CONCEPT DEVELOPMENT FOR AN AIRBAG CRASH-PROTECTION SYSTEM  
TOPIC# 21      OFFICE: AVSCOM      IDENT#: 33905

THE LATEST U.S. ARMY PRODUCTION HELICOPTERS INCLUDE CREWSEATS WHICH SIGNIFICANTLY REDUCE THE PROBABILITY OF SPINAL INJURY DUE TO VERTICAL IMPACT FORCES. HOWEVER, THE RISK OF INJURY TO THE UPPER TORSO AND HEAD DUE TO SECONDARY IMPACTS IS STILL UNACCEPTABLY HIGH. ONE OF THE REASONS FOR THIS IS THAT THE STANDARD FIVE-POINT RESTRAINT SYSTEM IS NOT DESIGNED TO RESTRAIN LATERAL MOTION, AND IMPACTS WITH HIGH VERTICAL LOADS RESULT IN COMPRESSION OF THE UPPER TORSO AND EXTENSIVE HEAD AND TORSO MOTION WITHIN THE RESTRAINT. NEWER AIRCRAFT, SUCH AS LHX, WILL INCREASE THIS HAZARD BY REDUCING THE COCKPIT VOLUME, BRINGING EVEN MORE ITEMS WITHIN THE STRIKE ENVELOPE OF THE SEATED OCCUPANT, AND BY INCREASING SPEED AND MANUEVERABILITY, RESULTING IN CRASH IMPACTS WITH HIGHER ENERGY AND A WIDE VARIANCE OF AIRCRAFT ATTITUDES. A PROGRAM TO EVALUATE THE FEASIBILITY OF IN-

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STALLING AIRBAGS INTO A HELICOPTER COCKPIT TO REDUCE THE SECONDARY IMPACT HAZARDS IS OUTLINED. THE FOUR-TASK RESEARCH EFFORT INCLUDES AN EVALUATION OF INJURY PATTERNS, COMPUTER MODELING OF BODY KINEMATICS, DEVELOPMENT OF PERFORMANCE REQUIREMENTS, AND CONCEPTUAL DESIGN OF AN AIRBAG SYSTEM. THE LAST TASK, DEVELOPING CONCEPTUAL DESIGNS, IS A SIGNIFICANT PERCENTAGE OF THE PHASE I EFFORT AND WILL DRAW HEAVILY FROM STATE-OF-THE-ART AUTOMOTIVE AIRBAG TECHNOLOGY.

SIMULA INC  
10016 S 51ST ST  
PHOENIX, AZ 85044  
CONTRACT NUMBER:  
JOSEPH W COLTMAN  
TITLE:  
DEVELOPMENT OF A RECLINED CRASHWORTHY CREWSEAT  
TOPIC# 22      OFFICE: AVSCOM      IDENT#: 33906

THE FEASIBILITY OF MODIFYING CRASHWORTHY CREWSEAT DESIGNS TO ACCOMMODATE A RECLINED SEAT BACK COMPATIBLE WITH FUTURE LOW-PROFILE MILITARY AIRCRAFT WILL BE EXPLORED. A PARAMETRIC STUDY WILL BE CONDUCTED, CONSIDERING A MATRIX OF SEAT BACK ANGLES, SEAT PAN ANGLES, AND SEAT STROKE ANGLES. COMPUTER PROGRAM SOM-LA (SEAT/OCCUPANT MODEL - LIGHT AIRCRAFT), WHICH MODELS THE DYNAMIC RESPONSE OF THE SEAT OCCUPANT AND SEAT WILL BE USED TO EVALUATE THE IMPACT OF CHANGES IN THESE PARAMETERS. INJURY EVALUATION CRITERIA WILL INCLUDE EIBAND, DRI, AND SPINAL COMPRESSION LOAD. FOLLOWING COMPLETION OF THE PARAMETRIC STUDY, A PRELIMINARY SPECIFICATION FOR CRASHWORTHY CREWSEATS WITH RECLINED BACKS WILL BE PREPARED. IT WILL OUTLINE APPROPRIATE DESIGN PARAMETERS FOR A GIVEN SEAT BACK ANGLE. PRE-LIMINARY DESIGN STUDIES WILL ALSO BE CONDUCTED TO DETERMINE THE FEASIBILITY OF DESIGNING CREWSEATS IN ACCORDANCE WITH THE PROPOSED SPECIFICATIONS. THESE WILL INCLUDE, AS A MINIMUM, AIRCRAFT INTER-FACE, FUNCTION, AND APPROXIMATE WEIGHT PENALTIES, IF ANY.

SIMULATION TECHNOLOGIES INC  
PO BOX 7009  
HUNTSVILLE, AL 35807  
CONTRACT NUMBER:  
DR DWIGHT A McPHERSON  
TITLE:  
ANTENNA CROSS-COUPPLING IN A DAMPED RESONANT CAVITY  
TOPIC# 34      OFFICE: MICOM      IDENT#: 34606

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A THEORETICAL ANALYSIS OF THE 4-WIRE TEM GENERATOR BY LIEPA AND JAREM HAS SHOWN THAT UNIFORM TEM WAVES CAN BE GENERATED OVER A 6 FT. DIAMETER TARGET REGION AT VHF FREQUENCIES. WE HYPOTHEZIZE THAT BOTH POLARIZATION AND PHASE FRONT TILT CAN BE ACHIEVED ALSO WITH THIS SYSTEM BY CONTROLLING THE FOUR EXCITATION CURRENTS INDEPENDENTLY. FOR THIS PHASE I EFFORT SIMULATION TECHNOLOGIES PROPOSES TO BUILD AND TEST A SCALE MODEL OF THE TEM GENERATOR AND TEST OUR HYPOTHESIS. THE SCALE MODEL WILL OPERATE AT S-BAND (2 GHz - 4 GHz) AND WILL BE USED TO ASSESS THE FEASIBILITY OF BUILDING A FULL SCALE PROTOTYPE IN PHASE II.

STANDARD SCIENTIFIC INC  
925 WEBSTER ST  
NEEDHAM, MA 02192  
CONTRACT NUMBER:  
CHIA-LING HU

TITLE:

A NOVEL IMMUNOASSAY FOR PALYTOXIN

TOPIC# 82

OFFICE: AMRDC

IDENT#: 34867

A NOVEL NON-ISOTOPIC IMMUNOASSAY WILL BE DEVELOPED FOR PALYTOXIN THAT IS SUFFICIENTLY SENSITIVE AND RAPID TO BE SUITABLE FOR THE DETECTION OF PALYTOXIN EXPOSURE IN THE FIELD. WE HAVE DEVELOPED A PROPRIETARY METHOD, THE AB-FLIA, AND SUCCESSFULLY APPLIED IT TO THE ANALYSIS OF LUTEINIZING HORMONE (LH), A HORMONE FOUND IN VERY LOW LEVELS IN SERUM AND URINE. THIS METHOD WILL BE SUITABLY MODIFIED AND APPLIED TO THE ANALYSIS OF PALYTOXIN. DURING PHASE I, TWO COMPETITIVE ASSAY APPROACHES WILL BE DEVELOPED: THE FIRST HAS THE PALYTOXIN ANTIBODY BOUND TO THE MICROTITER WELL: THE SECOND HAS THE TOXIN ITSELF BOUND TO THE MICROTITER WELL. IN BOTH METHODS, THE SIGNAL WILL BE INVERSELY PROPORTIONAL TO THE AMOUNT OF PALYTOXIN IN THE SAMPLE. THE POLYCLONAL ANTIBODY IS HIGHLY SPECIFIC FOR PALYTOXIN. THE NOVEL LABEL IS A VERY STABLE, NON-ENZYMATIC LABEL WHICH GENERATES AN EASILY DETERMINED COLOR CHANGE. A MAJOR ADVANTAGE OF THE METHOD IS THE LABEL IN THE AB-FLIA. IT IS WELL SUITED TO AN ASSAY THAT CAN BE USED OUTSIDE OF STRICTLY CONTROLLED LABORATORY CONDITIONS AND CAN BE DETECTED IN MINUTE QUANTITIES. THE ULTIMATE GOAL IS A RAPID ULTRA-SENSITIVE ASSAY FOR PALYTOXIN THAT IS ROBUST

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ENOUGH TO BE USED IN THE FIELD TO DETECT PALYTOXIN EXPOSURE.

STRUCTURAL INTEGRITY ASSOCS  
3150 ALMADEN EXPWY - STE 226  
SAN JOSE, CA 95118  
CONTRACT NUMBER:  
SHU (STAN) TANG  
TITLE:  
FATIGUE LIFE MONITOR FOR NON-AIRFRAME COMPONENTS  
TOPIC# 4            OFFICE: AVSCOM            IDENT#: 33890

A FRAMEWORK OF A FATIGUE LIFE MONITORING SYSTEM IS PROPOSED FOR NON-AIRFRAME DYNAMIC MECHANICAL COMPONENTS. THIS SYSTEM INCLUDES THE ELEMENTS OF DATA ACQUISITION, ALGORITHMS FOR FORMULATING DYNAMIC PEAK STRESS, DAMAGE TOLERANCE EVALUATION AND DATA MANAGEMENT. THE CALCULATION OF DYNAMIC PEAK STRESSES UTILIZES A NOVEL GREEN'S FUNCTION/DUHAMEL INTEGRAL APPROACH WHICH HAS BEEN PROVEN IN NUCLEAR POWER PLANT FATIGUE MONITORING APPLICATIONS. THIS APPROACH DRASTICALLY REDUCES COMPUTATION TIME, THUS ENABLING THE SYSTEM TO BE DEVELOPED ON A SMALL 286/386 BASED MICRO-COMPUTER. ULTIMATELY, THE SYSTEM WILL ALLOW DIRECT MONITORING OF FATIGUE DAMAGE ACCUMULATION OR CRACK GROWTH IN FATIGUE CRITICAL COMPONENTS, BASED ON DATA INPUT FROM ON-BOARD SENSORS.

SUPERCONDUCTOR TECHNOLOGIES INC  
460 WARD DR - STE F  
SANTA BARBARA, CA 93111  
CONTRACT NUMBER:  
DR ROBERT HAMMOND  
TITLE:  
DESIGN FABRICATION AND TESTING OF HIGH TEMPERATURE SUPERCONDUCTIN  
PASSIVE MICROWAVE DEVICE  
TOPIC# 26            OFFICE: ETDL            IDENT#: 33406

A PROTOTYPE HTSC PASSIVE MICROWAVE DEVICE WILL BE DESIGNED, FABRICATED, AND TESTED. A LOW-LOSS DELAY LINE FOR APPLICATION IN A DIGITAL INSTANTANEOUS FREQUENCY MEASUREMENT (DIFM) AT 10 GHz WILL

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BE FABRICATED FROM LOW SURFACE RESISTANCE THIN FILMS OF  $\text{TiCaBaCuO}$  ON SINGLE CRYSTAL  $\text{MgO}$ . FILMS WITH SURFACE RESISTANCE LESS THAN 500 MICRO-OHMS AT 77K WILL BE USED. THE NORMAL MICROSTRIP TRANSMISSION LINE GEOMETRY WILL BE CONSIDERED (WHERE DESIGN TOOLS MOSTLY EXIST). OTHER MICROSTRIP GEOMETRIES, SUCH AS INVERTED AND SUSPENDED TRANSMISSION LINES WILL PROBABLE ALSO BE USED, ALTHOUGH, DESIGN TOOLS WILL REQUIRE SOME DEVELOPMENT BY STI. THE BEST DESIGN STRUCTURE, BASED ON MATERIALS PROPERTIES OF THE FILMS AND SUBSTRATES, WILL BE CHOSEN FOR FABRICATION OF A PROTOTYPE TRANSMISSION LINE. THE FULL TWO-PORT VECTOR SCATTERING PARAMETERS WILL BE MEASURED ON THIS LINE, UTILIZING A CRYOGENIC SCATTERING PARAMETER TEST BED.

TAU CORP  
485 ALBERTO WY  
LOS GATOS, CA 95032  
CONTRACT NUMBER:  
DR FRED SMITH  
TITLE:  
DIGITAL FOCUSING  
TOPIC# 48      OFFICE: TECOM/WSMR      IDENT#: 33411

THE PROPOSED EFFORT DEVELOPS A SYSTEM USING A VIDEO IMAGE PROCESSING TO MEASURE THE FOCUS, OR DEFOCUS, OF AN OPTICAL INSTRUMENT OVER A SELECTABLE AREA OF THE IMAGE, AND THEN TO ADJUST THE FOCUS. THE TECHNIQUE CAN BE APPLIED TO OBJECTS THAT ARE SILHOUETTES OR TO OBJECTS OR REGIONS THAT HAVE ONLY RANDOM TEXTURE, I.E., HAVE NO EDGES. THE KEY PROBLEM SOLVED BY THIS TECHNIQUE IS TO SENSE THE DEFOCUS EVEN WHEN THE IMAGE IS NOT NOTICEABLE DEFOCUSED. THIS IS NECESSARY BECAUSE THE VIDEO IMAGE IS ALSO BEING USED FOR SUCH AUTOMATIC TASKS AS MOUNT-CONTROL TRACKING AND/OR FOR DATA COLLECTION. ADDITIONAL DESIGN CRITERIA FOR THE PROPOSED DIGITAL FOCUSING SYSTEM ARE SPEED OF OPERATION AND COST. THE GOAL IS TO MEASURE THE FOCUS TEN TIMES PER SECOND AND TO CORRECT IT FIVE TIMES PER SECOND. THE PROPOSED SYSTEM WILL KEEP THE COST OF THE IMAGE PROCESSING HARDWARE LOW BY SELECTING ONLY OFF-THE-SHELF, COMMERCIALY AVAILABLE HARDWARE. NO ESOTERIC, SPECIALLY BUILT HARDWARE SYSTEMS ARE NEEDED FOR THE IMAGE PROCESSING.

TECHNICAL DIRECTIONS INC  
1210 OAKBROOK DR  
ORTONVILLE, MI 48462  
CONTRACT NUMBER:  
VERN E BROOKS  
TITLE:  
CERAMIC COMPONENT FEASIBILITY DEMONSTRATION IN A SMALL TURBOJET ENGINE  
TOPIC# 39      OFFICE: MICOM      IDENT#: 34611

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AN OPERATIONAL DEMONSTRATION OF THE TECHNICAL FEASIBILITY OF A HIGH TEMPERATURE SMALL TURBOJET ENGINE IS PROVIDED BY THIS PROGRAM. THIS DEMONSTRATION CONFIRMS THAT A CERAMIC RADIAL TURBINE WHEEL CAN WITHSTAND THE SHORT DURATION HIGH TEMPERATURE EXPOSURE REQUIRED OF A SMALL TACTICAL MISSILE ENGINE. SINCE THE TURBINE WHEEL IS THE MOST CRITICAL CERAMIC COMPONENT OF A NEW HIGH TEMPERATURE ENGINE, THE OVERALL FEASIBILITY OF THIS NEW ENGINE IS ACCOMPLISHED. THIS PROGRAM ALSO PROVIDES A NEW ENGINE DESIGN WHICH COMBINES TURBOCHARGER AND AVAILABLE CERAMICS TECHNOLOGIES TO PROVIDE A "TRULY EXPENDABLE" HIGH PERFORMANCE SMALL TURBOJET ENGINE. AN OVERALL DEVELOPMENT STRATEGY IS PROVIDED FOR THE IMPLEMENTATION OF CERAMIC COMPONENTS WITH THE LOWEST DEVELOPMENT. A SYSTEMATIC IMPLEMENTATION OF CERAMIC COMPONENTS IS OUTLINED WHICH INCLUDES THE TURBINE WHEEL, TURBINE BEARING, TURBINE NOZZLE, HEAT SHIELD, AND COMBUSTOR IN A MANNER THAT MINIMIZES DEVELOPMENT TIME AND COST.

THOMPSON ALUMINUM CASTING CO INC  
4850 CHAINCRAFT RD  
GARFIELD HEIGHTS, OH 44125  
CONTRACT NUMBER:  
R A THOMAS  
TITLE:  
INTEGRATED COMPOSITE FLOW CASTING  
TOPIC# 19      OFFICE: AVSCOM      IDENT#: 35693

DEVELOP A METHOD AND APPARATUS TO NOT SQUEEZE CAST A HOMOGENOUS MAGNESIUM AND DISCONTINUOUS FIBER OR ALUMINUM AND DISCONTINUOUS FIBER METAL MATRIX COMPONENT. A GENERIC TEST BAR OR MECHANISM WILL BE DEVELOPED TO TEST SEPARATELY CAST SPECIMENS TO CORRELATE TEST DATA. PHASE I WILL CONSIST OF FABRICATION OF THE GENERIC TEST BAR MECHANISM WITH A FIXED FIBER FRACTION AT VARIOUS SQUEEZE PRESSURES. PHASE II WILL CONSIST OF FABRICATING A FULL SCALE COMPONENT USING THE INTEGRATED COMPOSITE FLOW CAST SYSTEM. THE TEST DEVICE FABRICATED IN PHASE I WILL BE USED TO CORRELATE TEST DATA WHERE TEST BARS CAN'T BE EXTRACTED PRACTICALLY FROM THE FULL SCALE COMPOSITE COMPONENT.

TPL INC  
1549 GLORIETTA NE  
ALBUQUERQUE, NM 87112  
CONTRACT NUMBER:  
MARK L PERRY  
TITLE:  
AN INTEGRATED APPROACH TO THE CORRELATION OF INSENSITIVE MUNITION TESTS TO CARD GAP VALUES  
TOPIC# 40      OFFICE: MICOM      IDENT#: 34612

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CARD GAP TESTS ARE THE HAZARD STANDARDS BY WHICH ENERGETIC MATERIALS ARE CLASSIFIED. THE USE OF INSENSITIVE MUNITIONS REQUIRES PERFORMANCE RESPONSE INFORMATION TO SENSITIVITY TESTS SUCH AS BULLET/FRAGMENT IMPACT AND SHOCK IMPACT. NO CORRELATION METHODS EXIST BETWEEN CARD GAP TESTS AND SENSITIVITY TESTS, RESULTING IN THE NEED TO CONDUCT EXTENSIVE EXPERIMENTAL INVESTIGATIONS. IT IS HYPOTHE- SIZED THAT RESPONSE PROBABILITY DISTRIBUTION CURVES CAN BE ESTABLISHED FOR INSENSITIVE MUNITIONS AS A FUNCTION OF STIMULUS TYPE AND STIMULUS MAGNITUDE. BASED ON A CORRELATABLE ENERGY CRITERION BETWEEN STIMULUS - RESPONSE PROBABILITY DISTRIBUTION CURVES. THE DEVELOP- MENT OF SUCH CORRELATION RELATIONSHIPS CAN BE AIDED THROUGH THE USE OF ANALYTICAL SIMILARITY METHODS. RESPONSE PROBABILITY DISTRIBUTION CURVES WILL BE ESTABLISHED FOR ONE INSENSITIVE MUNITION WITH TWO PARAMETERS FOR CARD GAP AND BULLET IMPACT TESTS. THE FEASIBILITY OF CORRELATING RESPONSE PROBABILITY DISTRIBUTION CURVES WILL BE DEMONSTRATED BASED ON AN INVESTIGATION INTO ANALYTICAL SIMILARITY METHODS, A NUMERICAL MODELING METHODOLOGY TO ASSIST IN CORRELATION WILL BE FORMULATED. TPL AND THE CENTER FOR EXPLOSIVE TECHNOLOGY RESEARCH HAVE THE NEEDED EXPERIENCE AND CAPABILITIES TO SUCCESSFULLY CONDUCT THE PROPOSED PROGRAM.

TRIFID CORP  
744 OFFICE PKWY - STE 224  
ST LOUIS, MO 63141  
CONTRACT NUMBER:  
MARSHALL B FAINTICH  
TITLE:  
CONTROLLED DIGITAL IMAGE DATA BASE  
TOPIC# 62      OFFICE: ETL      IDENT#: 34877

A CONCEPT IS DEVELOPED TO PERFORM RIGOROUS, ANALYTICAL, MULTI-SENSOR TRIANGULATION FOR THE ABSOLUTE CONTROL OF DIGITAL IMAGES WITHIN A LARGER DATA BASE ENVIRONMENT. PROCEDURES TO INTEGRATE THE CONTROLLED DIGITAL IMAGES INTO THE LARGER DATA BASE STRUCTURE ARE DEFINED, AND FUNCTIONAL OPERATIONS INVOLVING REGISTRATION OF RECONNAISSANCE IMAGERY FOR THE BEST DISPLAY USING COMBINATIONS OF LOGIC AND TOPO- GRAPHIC INFORMATION ARE DISCUSSED. SYSTEM SPECIFICATIONS AND OPERATION CONCEPTS ARE OUTLINES. STORAGE, RETRIEVAL AND MAINTENANCE

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OF THE DIGITAL DATA BASE ARE DEFINED. HARDWARE REQUIREMENTS ARE  
DEFINED AS A FUNCTION OF DISPLAY, TIMING, AND COST.

UNIVAX CORP  
12111 PARKLAWN DR  
ROCKVILLE, MD 20852  
CONTRACT NUMBER:  
DR W RIPLEY BALLOU  
TITLE:  
THE DEVELOPMENT OF PROTECTIVE MONOCLONAL ANTIBODIES AGAINST  
TETRODOTOXIN  
TOPIC# 82 OFFICE: AMRDC IDENT#: 34868

THE OVERALL GOAL OF THIS SBIR PROPOSAL IS THE DEVELOPMENT OF HUMAN  
MONOCLONAL ANTIBODIES (MABS) THAT BIND TO AND NEUTRALIZE TETRODOTOXIN  
(TTX), A LOW MOLECULAR WEIGHT NEUROTOXIN. IN PHASE I WE WILL PREPARE  
A SERIES OF TTX CONJUGATE VACCINES TO PREPARE MURINE MABS THAT BIND  
TO VARIOUS REGIONS OF THE TOXIN MOLECULE. WE THUS HOPE TO IDENTIFY  
IMMUNOGENS SUITABLE FOR USE IN PREPARING HUMAN MONOCLONALS AGAINST  
TTX IN PHASE II. NEUTRALIZING HUMAN MABS ARE EXPECTED TO BE USEFUL  
FOR BOTH THE PROPHYLAXIS AND THERAPY OF TETRODOTOXIN POISONING AND  
COULD BE IMPORTANT IN THE DEVELOPMENT OF POTENTIALLY PROTECTIVE  
ANALOGS. MABS PRODUCED IN PHASE I MAY ALSO BE USEFUL FOR THE  
DEVELOPMENT OF RAPID AND SENSITIVE ASSAYS FOR THE DETECTION OF TTX  
HAVING COMMERCIAL AND DEFENSE APPLICATIONS. MORE IMPORTANTLY, THESE  
STUDIES SHOULD ALSO LEAD TO IMPROVE METHODS OF PRODUCING HUMAN MABS  
AGAINST OTHER NONIMMUNOGENIC COMPOUNDS AND THUS COULD BE BROADLY  
APPLICABLE TO THE DEVELOPMENT OF REAGENTS AND THERAPEUTICS FOR OTHER  
TOXINS AND LOW MOLECULAR WEIGHT DRUGS HAVING NARROW THERAPEUTIC  
INDICES.

UNIVERSAL SENSORS INC  
5258 VETERANS BLVD - STE D  
METAIRIE, LA 70006  
CONTRACT NUMBER:  
DAVID D CUNNINGHAM  
TITLE:  
ELECTRODE PROBES FOR THE RAPID ASSAY OF SEAFOOD TOXICANTS  
TOPIC# 82 OFFICE: AMRDC IDENT#: 34869

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ELECTRODE PROBES WILL BE DEVELOPED FOR THE RAPID ASSAY OF SEAFOOD TOXINS (E.G., PARALYTIC SHELLFISH POISON AND CIGUATOXIN) IN COMPLEX SAMPLES SUCH AS FIN AND SHELLFISH. THE ENZYME IMMUNOCHEMICAL TESTS WILL BE EXTREMELY SPECIFIC, CONSIDERABLY REDUCING SAMPLE CLEAN-UP REQUIREMENTS. IMMOBILIZATION OF ANTIGENS AND ANTIBODIES WILL BE INVESTIGATED TO PROVIDE THE DESIRED SELECTIVITY. ENZYME AMPLIFICATION WILL BE USED TO PROVIDE THE NECESSARY SENSITIVITY. THE STABLE BASE ELECTRODE WILL BE CONSTRUCTED USING INEXPENSIVE ELECTRONICS. THE SENSITIVITY, ACCURACY AND REPRODUCIBILITY OF EACH TYPE OF ASSAY FORMAT WILL BE COMPARED. DEVELOPMENT WILL INCLUDE OPTIMIZATION OF THE ELECTRODE SYSTEM AND STUDY OF THE KINETICS OF THE SYSTEM TO GIVE SENSITIVE, RAPID ASSAYS IN ONLY A FEW MINUTES. THE INEXPENSIVE ELECTRODE PROBES SHOULD BE RAPID (<10 MINUTES), SPECIFIC, SENSITIVE (PPB LEVELS), AND CAPABLE OF BEING USED BY PERSONNEL WITH LITTLE TRAINING. IN ADDITION, THE PROBE WILL BE DESIGNED FOR INCORPORATION INTO AUTOMATED SYSTEMS. THE PROPOSED WORK WILL DEMONSTRATE THE POSSIBILITY OF DEVELOPING SPECIFIC, SENSITIVE IMMUNO PROBES FOR THE DETERMINATION OTHER CLASSES OF COMPOUNDS SUCH AS VERTEBRATE TOXINS, ANTIBIOTICS, STEROIDS, AND PESTICIDES.

VECTOR RESEARCH INC

PO BOX 1506

ANN ARBOR, MI 48106

CONTRACT NUMBER:

W P CHERRY

TITLE:

ANALYTIC METHODS FOR ELECTRONIC WARFARE VULNERABILITY ASSESSMENTS

TOPIC# 30

OFFICE: VAL

IDENT#: 33409

THE PROPOSED RESEARCH WILL DEVELOP AN ANALYTIC MODEL TO SUPPORT THE ASSESSMENT OF ELECTRONIC WARFARE VULNERABILITY OF AIR DEFENSE SYSTEMS AND TO EVALUATE APPROPRIATE ECCM SYSTEM CONCEPTS OR SYSTEMS. THE MODEL WILL REPRESENT THE TECHNICAL AND TACTICAL ASPECTS OF AIR OPERATIONS AGAINST AN AIR DEFENSE SYSTEM RELATING ENGINEERING LEVEL PARAMETERS TO OPERATIONAL PERFORMANCE. IT WILL INCLUDE THREAT INTELLIGENCE COLLECTION ASSETS EMPLOYED AGAINST THE AIR DEFENSE SYSTEM, THE USE OF ELECTRONIC AND LETHAL MEANS TO ATTACK AND DEGRADE THE SYSTEM AND THE LOCAL ENGAGEMENT INTERPLAY BETWEEN THREAT ON-BOARD

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OR ESCORT SYSTEMS AND THE GROUND-BASED WEAPONS. THE MODEL WILL BE DEVELOPED USING A RATE BASED APPROACH PREVIOUSLY DEMONSTRATED IN MODELING ESM SENSOR SYSTEMS, AND AIR DEFENSE SYSTEMS PERFORMANCE. AN ACTIVE/PASSIVE DUEL MODEL WILL BE USED FOR MODELING ANTI-RADIATION MISSILES. A MARKOV RENEWAL PROCESS/COMPETING RISK APPROACH IS PROPOSED AS A BASIS FOR SUCH MODELS AND TO REFLECT THE DYNAMIC INTERPLAY OF ECM-ECCM IN AN ENGAGEMENT. THE RESULTING MODEL IS INTENDED FOR USE IN A STAND ALONE MODE OR FOR INTEGRATION INTO FORCE-ON-FORCE MODELS. IT WILL SERVE AS A BASIS FOR A FULL EW VULNERABILITY MODEL, ALSO TO BE INTEGRATED INTO FORCE-ON-FORCE MODELS.

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TOTAL NUMBER OF AWARDS: 92